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CORRECTIONS

MONTHLY WEATHER REVIEW, February 1942, vol. 70: Page 34, Nevada, tempature departure, "−1.9" should be "−2.4" March 1942, vol. 70: Page 57, Nevada, temperature departure, "+1.4" should be "−1.4". May 1942, vol. 70: Page 107, Nevada, temperature departure, "−3.0" should be "−2.3"; November 1942, vol. 70: Page 266, Chart VII, Total Snowfall, "March" should be "November".

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RELIABILITY OF THE FOREST SERVICE TYPE RAIN-GAGE

By G. L. HAYES

[Assistant Forester, Northern Rocky Mountain Forest and Range Experiment Station, Missoula, Mont., July 1942]

The Forest Service type rain-gage was originated by W. B. Osborne of the Portland, Oreg., office of the U. S. Forest Service to meet a need for reliable rainfall measurements at low cost. Many hundreds of them, over 700 on the national forests of northern Idaho and western Montana alone, are now being used during the summer months as aids to forest-fire control management. They supply the only measurements of summer precipitation on millions of acres of forested mountain watersheds. Without low-cost gages such measurements could not be afforded at most of these stations.

The Forest Service type gage is similar in form to the Weather Bureau standard type but differs from it in capacity, workmanship, and materials. It consists of a galvanized sheet iron receiver having a vertical rim that extends two inches above the funnel, a galvanized sheet iron overflow can, and an inner measuring tube of seamless brass closed at one end by a brass disk. All joints are soldered. For economy in construction, a commercial size of brass tubing having an inside diameter of 2.416 inches and a cross-sectional area of 4.584 square inches was adopted for the measuring tube. The receiver was then made to have an area just ten times greater, or 45.84 square inches, with a diameter of 7.64 inches. The capacity of the gage is one-half inch in the measuring tube and about six inches in the overflow can. During normal times these gages sold for $1.25 to $2.00, and short measuring sticks 5 to 20 cents, apiece. The sheet iron receivers become bent out of shape more readily than the receivers of sturdier gages, hence correspondingly greater care in handling is necessary to preserve accuracy. The gage may be mounted on a pipe support as shown in figure 1, or a box-type similar to, but shallower than, the one shown holding the Weather Bureau standard type gage.

Tests to determine the reliability of the Forest Service type gage have been conducted at the Priest River Experimental Forest, Idaho, the Bent Creek Experimental Forest, N. C., and elsewhere. The method of testing employed at Priest River consisted of comparing the Forest Service type with two other types that are officially accepted and used by the nation's foremost meteorological organizations. The three gages, including one Forest Service type, one Weather Bureau standard type, and one Friez tipping-bucket type, were arranged in a triangular formation with the gages 5 feet apart and the receivers all at the same height, as shown in figure 1. The Bent Creek installation consisted of two gages only, a Forest Service and a Weather Bureau standard in close proximity.

An analysis of six seasons' comparisons of the three types of gages at Priest River and one season's comparison of the two types at Bent Creek are summarized in table 1. At least two different Forest Service and two different Weather Bureau standard gages were used in the Priest River comparisons. The same gages were used, unchanged, from 1937 to 1940, but for 1941 both gages were replaced. It is not known whether the same ones were used in 1936 as in 1937–40.

TABLE 1.—*Comparison of the Forest Service and tipping-bucket type rain-gages with the Weather Bureau standard*

Place and year	Number measurements	Precipitation			Differences		Standard error of differences	
		F.S. gage	W.B. gage	T.B. gage	F.S.-W.B.	T.B.-W.B.	F.S.-W.B.	T.B.-W.B.
Priest River:		*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
1936	30	5.07	5.06	5.07	0.01	0.01	0.0175	0.0337
1937	26	7.31	7.27	7.13	.04	[1] .14	.0400	.0484
1938	43	6.08	6.06	5.88	.02	[1] .18	.0284	.0559
1939	53	7.22	7.19	6.96	.03	[1] .23	.0413	.0562
1940	55	11.11	11.05	10.81	.06	[1] .24	.0340	.0566
1941	104	18.44	18.72	18.16	[1] .28	[1] .56	.0858	.0792
Bent Creek:								
1937	19	8.45	8.40		.05		.0478	

[1] Statistically significant at the 0.01 level of probability.

The same tipping-bucket gage was used throughout. The catches of the tipping-bucket gage were measured by draining the rainfall into the measuring tube, which can be seen under the gage in figure 1, and measuring it with the usual ruled stick. Each season's comparison at Priest River lasted from approximately May 1 to October 31. The Bent Creek test was made in July and August 1937.

In five out of the six Priest River tests, the Forest Service gage agreed more closely than the tipping-bucket with the Weather Bureau standard. Furthermore, the catch (both total seasonal and daily average) of the Forest Service and Weather Bureau types differed by a statistically significant [1] amount in only one out of the six tests, whereas the tipping-bucket differed significantly from that of the Weather Bureau standard in five out of the six tests. Furthermore, the standard errors of the differences show that in five out of six tests the differences of the Forest Service gage from the standard were more consistent than were the differences produced by the tipping-bucket. In other words, the catch of the Forest Service type did not tend so much as that of the tipping-bucket type to differ from the Weather Bureau standard catch by a large amount on one day and only a small amount on another.

The Bent Creek test [2] agreed with the Priest River comparisons between Forest Service and Weather Bureau types. The Forest Service gage catch of 8.45 inches differed from the Weather Bureau standard type catch of 8.40 inches by only 0.05 inch, which is not statistically

[1] The method used to test for significance is explained on page 30 in Paterson, D. D., *Statistical technique in agricultural research*, New York, 1939.
[2] Data furnished by George M. Jemison of the Appalachian Forest and Range Experiment Station, Asheville, N. C.

significant when compared to the standard error of the difference, 0.0478 inch.

These data, which include 933 measurements of 311 precipitation days on the Priest River Experimental Forest and 38 measurements of 19 precipitation days on the Bent Creek Experimental Forest, show that the inexpensive Forest Service type rain gage is entirely dependable for all ordinary measurements of rainfall where large capacity or automatic recording is not required. Other factors such as topography and obstructions surrounding the instrument exposure may introduce deviations and errors far greater than those caused by the design or low cost of the Forest Service gage.

During the emergency caused by the war this smaller gage has other features to recommend it. It contains only a fraction of the amount of brass and iron that is required by the larger gages, and it can be built by any competent tinsmith.

PRELIMINARY REPORT ON TORNADOES IN THE UNITED STATES DURING 1942

By J. L. BALDWIN

[Weather Bureau, Washington, February 1943]

These tabulations are derived from data on "Severe Local Storms" appearing in the MONTHLY WEATHER REVIEW and in the monthly Climatological Data of the different Sections of the United States. They show the approximate monthly and annual number of tornadoes and the deaths, injuries, and property damage caused by them in the States and the country as a whole. Table 1 is a tabulation of known tornadoes and table 2 of possible tornadoes. A final and more complete report will appear in the United States Meteorological Yearbook, 1942.

Tornadoes during 1942 were normal in many respects. The greatest number in the United States for any month was 31 in May, which is almost exactly normal in respect to time and number. It is also noted that the total number reported for the year was 132, or 153 if we include the possible tornadoes, against a 27-year average of about 140; furthermore, the total damage produced by these twisters was tabulated as $11,818,400, or approximately normal.

The greatest human loss for any month was 111 killed and 781 injured in March, followed by 86 killed and 444 injured in April, while during July, August, September, and November no deaths were reported and only 3 injuries. The 335 deaths for 1942 exceeded the annual average of 265. There were 114 deaths and over 250 injuries in Oklahoma and 66 deaths and 527 injuries in Mississippi. Almost one-half of the total number of tornadoes, deaths, and property losses occurred in the four States of Kansas, Oklahoma, Texas, and Iowa.

The greatest monthly property loss, approximately $3,862,000, occurred in April of which amount $2,015,000 was at Pryor, Okla., on the 27th and $1,500,000 at Crowell, Tex., on the 28th.

The most severe tornado during 1942 and one of the most disastrous ever to strike Oklahoma occurred at Pryor, Mayes County, at 3:45 p. m., April 27. It moved northeastward over an area one-fourth mile wide and about 20 miles long. The center passed over the principal business section of the city of Pryor, demolishing dozens of frame buildings and several brick and stone buildings. Torrential rains and some hail accompanied it. The American Red Cross reported 52 killed and 181 treated for injuries. Property damage was estimated at $2,000,000. Another very severe tornado struck the southwestern suburbs of Oklahoma City at about 8:41 p. m., June 12. It dropped suddenly to the surface, moved slowly southeastward for 200 or 300 feet, curved to the southwest for another few hundred feet, recurved to the east for a short distance, then curved north, describing almost a semicircle before beginning its westward movement. Its translation was markedly slow. Very little rain and no hail accompanied the storm, but much mud was present in the funnel cloud. It caused 35 deaths, 29 serious injuries, and destroyed 73 homes and damaged 31 others. A detailed technical study of the Pryor and other recent tornadoes was prepared by the Forecast District at Kansas City, Mo.

A very destructive tornado also occurred at Crowell, Foard County, Tex., at about 9:30 p. m., April 28. It moved from the northwest, killing 11 people, injuring 250, and destroying property estimated at $1,500,000 in an area 1 by 3 miles, principally within the city of Crowell. Another severe tornado struck Berryville, Ark., at 10:30 p. m., October 29, killing 29 people, injuring over 100, and destroying 137 homes and other buildings and damaging 65 more.

The Guymon, Okla., tornado traveled from northeast to southwest contrary to the usual movement of tornadoes. Unusual movements were also noted in a few other cases, and especially by the Oklahoma City tornado mentioned above. Some of these tornado clouds traveled in series or on parallel routes during general storms and some did not reach the ground or only in places. It is interesting to note that the least destructive tornadoes reported during the year were 8 funnel clouds observed in Kansas during August in connection with 3 storms. They produced practically no damage, and it is stated that 7 of these funnel clouds did not reach the ground and that 6 of these 7 were observed extending down from the same storm cloud.

Some excellent pictures of the Lake Park, Iowa, tornado of May 30 and notes on the causes of destructive local storms are published in the Iowa section, Climatological Data of June 1942. These observed conditions agree with J. R. Lloyd's conclusion that "tornadoes appear to occur only in connection with upper-air cold fronts," and other deductions presented in his investigations that were published in the REVIEW of April 1942, under the title, "The Development and Trajectories of Tornadoes."

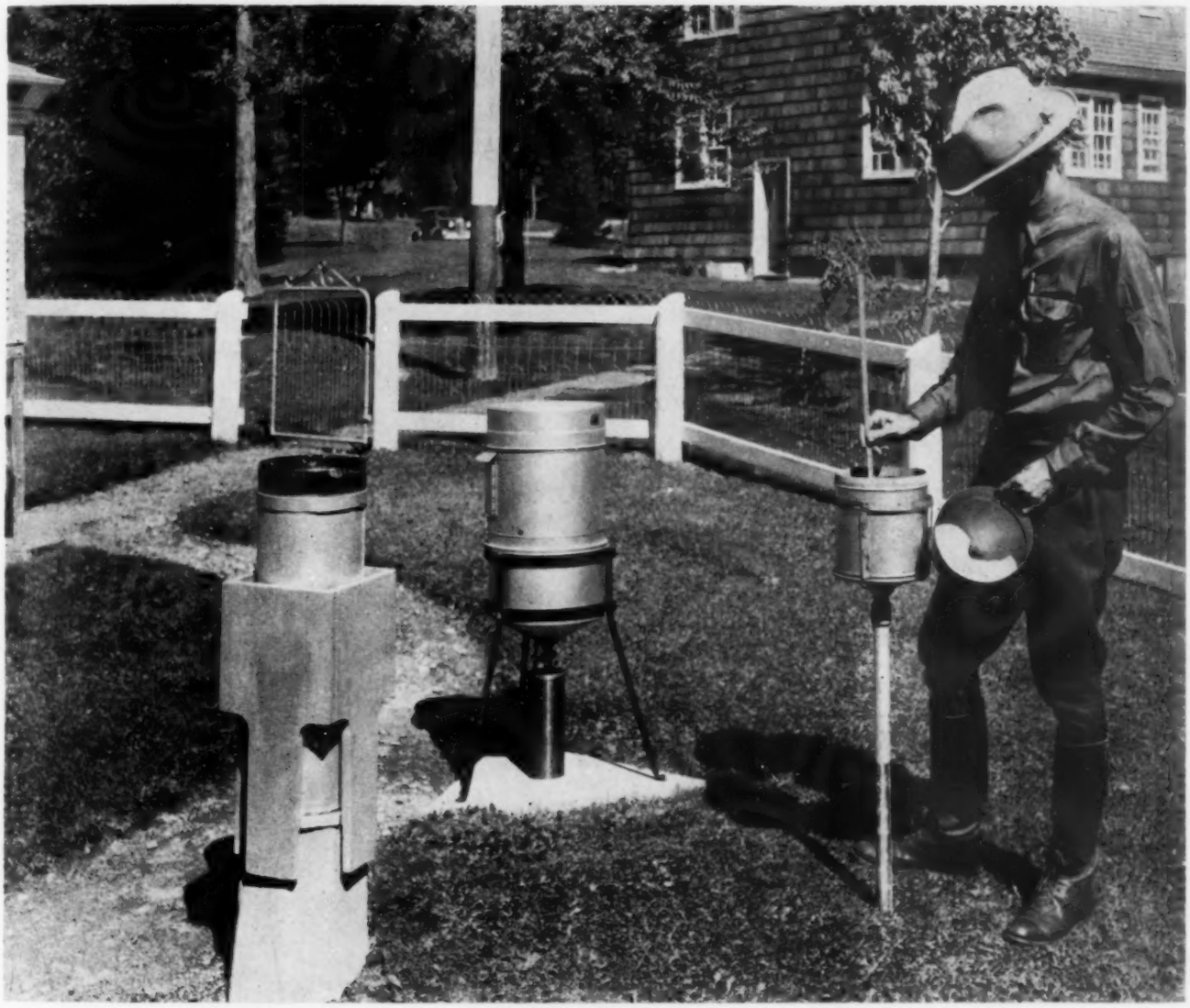

FIGURE 1.—Arrangement for comparison of the Weather Bureau standard (left), tipping-bucket (center), and Forest Service (right) types of rain-gages at the Priest River Experimental Forest headquarters

TABLE 1.—*Tornadoes and probable tornadoes*

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Alabama:													
Number	2												2
Deaths	1												1
Injuries	12												12
Damage ($ x 1,000)	22.0												22.0
Arkansas:													
Number		[2] 3								2			[2] 5
Deaths		7								29			36
Injuries		70								[2] 100			[2] 170
Damage ($ x 1,000)		1,750.0								515.0			2,265.0
Colorado:													
Number				2		2							4
Deaths				4		0							4
Injuries				(4)		0							(4)
Damage ($ x 1,000)				50.0		10.3							60.3
Florida:													
Number	1												1
Deaths	0												0
Injuries	5												5
Damage ($ x 1,000)	15.0												15.0
Illinois:													
Number			3				3						6
Deaths			20				0						20
Injuries			[2] 125				2						[2] 127
Damage ($ x 1,000)			825.0				[5] 671.5						[5] 1,496.5
Indiana:													
Number			3			3							6
Deaths			2			4							6
Injuries			[2] 40			(4)							[2] 40
Damage ($ x 1,000)			701.0			507.5							1,208.5
Iowa:													
Number					[2] 1	9	[2] 3						[2] 13
Deaths					0	1	0						1
Injuries					(2)	6							[2] 6
Damage ($ x 1,000)					50.0	[5] 70.0	[2] 30.0						150.0
Kansas:													
Number				4	8	4	1	8			1		26
Deaths				15	3	4	0	0			0		22
Injuries				(4)	(4)	(4)	0	0			0		(4)
Damage ($ x 1,000)				104.0	536.0	124.5	0.2	[2] 0			2.5		767.2
Kentucky:													
Number			1										1
Deaths			24										24
Injuries			108										108
Damage ($ x 1,000)			312.0										312.0
Louisiana:													
Number						1							1
Deaths						0							0
Injuries						0							0
Damage ($ x 1,000)						0.5							0.5
Minnesota:													
Number				2	3	2							7
Deaths				2	0	0							2
Injuries				7	(4)	0							[2] 7
Damage ($ x 1,000)				80.0	170.7	11.2							261.9
Mississippi:													
Number		1	[2] 1										[2] 2
Deaths		1	[2] 65										[2] 66
Injuries		27	500										527
Damage ($ x 1,000)		(3)	(3)										(3)
Missouri:													
Number					1								1
Deaths					0								0
Injuries					0								0
Damage ($x1,000)					5.0								5.0
Nebraska:													
Number				2	[2] 4	1							[2] 7
Deaths				0	6	0							6
Injuries				0	(2)	1							(2)
Damage ($x1,000)				33.0	[7] 200.0	10.0							[7] 243.0
North Carolina:													
Number												1	1
Deaths												1	1
Injuries												30	30
Damage ($x1,000)												45.0	45.0
Oklahoma:													
Number	1	1	1	4	5	1				1		1	15
Deaths	0	1	0	52	26	35				0		0	114
Injuries	1	5	1	[2] 181	[2] 33	[2] 29				0		(2)	[2] 250
Damage ($x1,000)	2.0	10.0	30.3	2,015.0	[7] 350.0	300.0				0.4		(6)	[2] 2,707.7
South Carolina:													
Number			1		1							3	5
Deaths			0		0							1	1
Injuries			7		0							6	13
Damage ($x1,000)			25.0		2.0							31.0	58.0
South Dakota:													
Number				2	1	1							4
Deaths				2	0	0							2
Injuries				6	0	0							6
Damage ($x1,000)				20.0	10.0	5.5							35.5
Tennessee:													
Number	1												1
Deaths	1												1
Injuries	1												1
Damage ($x1,000)	25.0												25.0
Texas:													
Number	[1] 1			2	3							5	11
Deaths	7			11	0							5	23
Injuries	1			250								(6)	[2] 251
Damage ($x1,000)	(6)			1,500.0	50.0							145.0	[2] 1,695.0
Virginia:													
Number									1				1
Deaths									0				0
Injuries													
Damage ($x1,000)									5.0				5.0

See footnotes at end of table.

TABLE 1.—*Tornadoes and probable tornadoes*—Continued

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Wisconsin:													
Number				1	4	1	2		2				10
Deaths				0	1	0	0		0				1
Injuries					3	0	1						[2] 4
Damage ($x1,000)				60.0	165.0	0.5	20.0		22.0				267.5
Wyoming:													
Number						[2] 2							[2] 2
Deaths						2							2
Injuries						6							6
Damage ($x1,000)						[9] 60.0							[9] 60.0
United States:													
Number	6	[2] 5	[2] 10	19	[2] 31	[2] 27	[2] 9	8	3	3	1	10	[2] 132
Deaths	9	9	[2] 111	86	36	46	0	0	0	29	0	7	[2] 333
Injuries	20	102	[2] 781	[2] 444	[2] 36	[2] 42	3	0		[2] 100	0	36	[2] 1,564
Damage ($x1,000)	64.0	[2] 1,760.0	[2] 1,893.3	3,862.0	[7] 1,538.7	1,100.0	[2] 721.7	[2] 0	27.0	515.4	2.5	221.0	[2] 11,705.6

[1] Press report.
[2] Probably more.
[3] Several injured.
[4] Many injured.
[5] Considerable damage.
[6] Several thousand dollars.
[7] Includes some hail and rain damage.
[8] Includes considerable straight-line wind damage.
[9] Part of a general storm.

TABLE 2.—*Tornadic winds and possible tornadoes*

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Alabama:													
Number	1												1
Deaths	0												0
Injuries	1												1
Damage ($x1,000)	5.0												5.0
Arkansas:													
Number										[2] 1			[2] 1
Deaths										0			0
Injuries										[3]			[3]
Damage ($x1,000)										[2] 15.0			[2] 15.0
Colorado:													
Number				1									1
Deaths				0									0
Injuries				0									0
Damage ($x1,000)				2.5									2.5
Kansas:													
Number						2			[2] 1				[2] 3
Deaths						0			0				0
Injuries													
Damage ($x1,000)						[5]			[5]				[5]
Louisiana:													
Number	3	1		1				1					6
Deaths	1	0		0				0					1
Injuries	4	0		4				0					8
Damage ($x1,000)	10.0	3.8		10.0				10.0					33.8
Minnesota:													
Number									1				1
Deaths													
Injuries													
Damage ($x1,000)									[5]				[5]
Oklahoma:													
Number				1		1				1			3
Deaths				0		0				0			0
Injuries				0		0				0			0
Damage ($x1,000)				3.0		8.0				5.0			16.0
South Carolina:													
Number			1				1						2
Deaths			0				0						0
Injuries			0				0						0
Damage ($x1,000)			2.5				25.0						27.5
South Dakota:													
Number								1					1
Deaths								0					0
Injuries								0					0
Damage ($x1,000)								7.0					7.0
Texas:													
Number	[1] 1			1									[2] 21
Deaths	0			1									1
Injuries	3			2									5
Damage ($x1,000)	[4]			3.0									[2] 6.0
United States:													
Number	5	1	1	4	0	3	1	2	[2] 2	[2] 2			[2] 21
Deaths	1	0	0	1		0	0	0		0			2
Injuries	8	0	0	6			0	0		[3]			[2] 14
Damage ($x1,000)	18.0	3.8	2.5	18.5		[2] 8.0	25.0	17.0	[5]	[2] 20.0			[2] 112.8

[1] Press report.
[2] Probably more.
[3] Several.
[4] Several thousand dollars.
[5] Reported in general storm.

THE WEATHER OF 1942 IN THE UNITED STATES

By J. L. BALDWIN

[Weather Bureau, Washington, February 1943]

The mean temperature for the year 1942, derived by weighting the averages for the varying areas of the several States, was exactly normal, being 53.2°, or the same as the average for the 1886 to 1942 period, during which time the highest mean annual temperature was 55.6° in 1921 and the lowest, 51.8° in 1917. With the exception of +1.3° in North Dakota, all the State annual averages for the past year were within 1° of their respective annual normals. The greatest negative departures were −1.0° for Idaho, followed by −0.8° for Louisiana. In respect to area, the annual mean temperatures were generally somewhat below normal in the Gulf States, Rocky Mountains, and Pacific States, except in Nevada and Washington, and practically normal to above elsewhere. The greatest plus departures were in the Northern Plains.

Maximum temperatures of over 100° were not recorded until April, with 104° at Laredo, Tex. on the 30th. The last month during the year with over 100° was October, with 107° at El Centro, Calif. A temperature of 99° was reported from Laredo, Tex. as late as November 25. Maximum temperatures of 100° and above were reported from every section, except New York and New England. Readings of 105° to 111° were quite general in the Great Plains a few times during the summer, but this is not unusual. The extreme highest temperature for 1942 was 126° at Cow Creek, Calif., on July 24. The highest ever recorded in the United States was 134° at Greenland Ranch, Death Valley, Calif., July 10, 1913.

Subzero temperatures drifted southeastward into the Cotton Belt as the year opened, with −15° at Miami, Tex. on January 5, and −2° at Hollywood, Ga., on the 11th. Below-zero temperatures were reported from North Dakota and the higher elevations of the West as late as April. They first began to reappear in the more northern Plains States and Rocky Mountains by the last week of October, reaching Kansas by the 29th of November. During December, −1° occurred at Celina, Tenn. on the 4th, and −4° at Mount Mitchell, N. C., on the 2d. The lowest temperature for the year was −52° at Taylor Park, Colo., on February 18. The lowest ever recorded in the United States was −66° at Riverside Ranger Station, Yellowstone Park, Wyo., on February 9, 1933.

Table 1 and the chart of annual temperature departures supplement these general remarks.

The first half of January was persistently cold, with subzero temperatures prevailing everywhere from the Rocky Mountains eastward to the Appalachians and reaching as far south as central Virginia, western North Carolina, and central Tennessee. A hard freeze penetrated the deep South with minimum temperatures as low as 16° in northern Florida. The last half was persistently warm in most sections, with temperatures averaging from 20° to almost 30° above normal in northwestern areas, however, subnormal temperatures continued in the Great Basin of the West. The monthly averages for about 70 percent of the States were below normal for January.

The relatively coldest month was February as shown by table 1. It is noted that all but six of the States had negative departures. For the month the average mean temperatures were above normal from the Dakotas to Wisconsin and in Washington and below normal elsewhere, with extreme departures of −6.1° in Colorado, −5.6° in Utah, and −5.5° in South Carolina. The first half of the month was mild to abnormally warm for the season, except slightly below normal in the more eastern States; the latter half was decidedly cold.

The mean monthly temperatures for March were near normal to slightly below in the Cotton Belt, decidedly above in the Northern States east of the Rocky Mountains, mostly below normal in the Rocky Mountain region and about normal in the Pacific States. The averages for April were generally above normal in all sections. During May they were about normal over the southern half of the country, considerably above in the Northeast, and about 3° to 5° below normal in the Northwest and Great Basin. June temperatures averaged nearly normal in most sections, while July averages were moderately above normal, except below in most of southern Texas.

The monthly mean temperatures for August show a widespread uniformity in respect to normal, ranging from near normal to slightly above. The first half of September was rather uniformly warm, but the latter part brought abnormally cold weather to nearly all sections east of the Rockies. Record-breaking low temperatures were experienced in a considerable north-central area, with unprecedented early snowfall. Average temperatures for the months of October and November were somewhat above normal in nearly all sections. Over 85 percent of the State averages for October had plus departures, but +3.0° for Nevada and +2.5° for North Dakota were the only State departures exceeding +2.0°

The relatively warmest month in respect to its normal was November, which also had over 85 percent of its averages above normal. The mean State temperatures were 3° or more above normal in a triangular area from New Mexico eastward to Alabama and thence northward over Kentucky and Missouri, with the greatest mean departure being +3.8° for Tennessee. During December temperatures were abnormally high from the central Great Plains westward, while east of this region the month was colder than normal in the central and northern States and somewhat above normal in the Southern States south of North Carolina and Tennessee.

The average annual precipitation for the country as a whole, based on weighted averages, was 31.10 inches for the past year, or 7 percent above the average for the 1886 to 1942 period, during which time the wettest year was 32.74 inches in 1915 and the driest 24.65 inches in 1910.

Figure 1 gives the State percentages of normal precipitation for the year; table 2 these percentages for the months and the year; and table 3, the monthly and annual amounts. The percentages of normal are also shown for first order stations by chart 2.

On an annual basis, the wettest State was Louisiana, with 56.84 inches and the driest was Nevada, with 7.60 inches. By State averages more than 50 inches of rain occurred in Alabama, Florida, Georgia, Louisiana, North Carolina, and Tennessee. On a departure basis, December was probably the wettest month, with 31 States having above normal precipitation. During this month the departures averaged 27 percent above normal. January was the relatively driest month. All States reported deficiencies for January, except Florida and Georgia, and the average monthly departure was 36 percent below normal. During April the totals were

from 2 to over 3 times the State normals in Arizona, California, Colorado, New Mexico, and Oklahoma, while Arizona had traces during May and June.

The greatest monthly amount reported at any station was 35.09 inches at Illahe, Oreg., in December, with 34.99 inches in the same State at Valsetz for November. Each month had some station without rain. California had 178 stations without rain in August, and Arizona reported none from 115 stations during May and June. It might be stated that in Hawaii during April of the past year, 111.75 inches of rain fell at Puohakamoe No. 2 and none at Waiopai Ranch.

Percentages of normal precipitation during the growing season, April 1 to September 30, 1942, are shown by

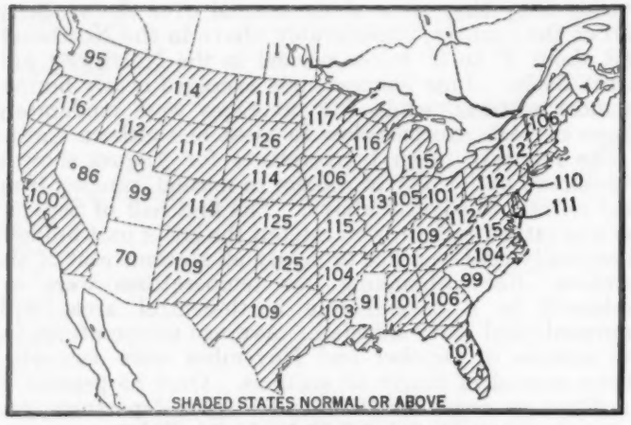

FIGURE 1.—Percentage of normal precipitation, 1942.

States in figure 2. During this season the total amounts were somewhat below normal in Nevada, Arizona, and Utah, and near normal in the Southeast, and far Northeast; elsewhere, they were above normal, with substantial excesses in the western Cotton Belt, Great Plains, western Lake region and especially in California. The active growing season, May to August, had a country-wide average of 12.12 inches, making it one of the wettest seasons of record. The weather during the past year was unusually favorable for crops on the whole, although there were a few adverse conditions, such as too much rain in northern States during part of the season, deficient moisture with an early summer drought in the East and south-central States, and unfavorably early fall frost in some sections.

During January, precipitation was decidedly scanty in most sections, especially between the Rocky Mountains and Mississippi River, and was above normal in the extreme Southeast and in some northeastern and more western areas. February precipitation was heavy in Florida and the Gulf coast sections and also above normal from the Ohio Valley to the Rocky Mountains. It was below normal in a belt from New Mexico northeastward to the middle and north Atlantic coasts.

In March, amounts were heavy in a large southeastern area, in the Atlantic States, and in a considerable north-central area, being the wettest March in some localities; while in the Southwest it was decidedly dry. During April, abnormally heavy rains occurred in the Southwest and one of the driest Aprils of record prevailed in the East. It was very dry southward over northern Florida, but heavy rains occurred in extreme southern Florida, with Miami reporting a maximum April rainfall of 13.62 inches.

The drought situation was mostly relieved in the Atlantic States during May and most of the northern portion of the country had above normal amounts, while a large portion of the Southwest had scanty rainfall. June was characterized by extreme dryness in the far Southwest and abnormally heavy rains in much of the interior of the country. Marked contrasts prevailed locally during July. For instance, Cairo, Ill., reported 20 percent of normal, while nearby St. Louis, Mo., had the wettest July since 1875; also, Abilene, Tex., and Vicksburg, Miss., had the second driest, while San Antonio and Corpus Christi, Tex., had the wettest July of record. In general, during August the southern half of the country had above normal precipitation, except the Southeast, and the northern half below normal, except in a few limited areas. September precipitation was above normal from southeastern Idaho and the eastern Rocky Mountain region eastward almost to the Atlantic coast, while it was decidedly below normal west of this region, and somewhat below in the immediate central and lower Mississippi Valley.

October precipitation was rather spotted, being mostly below normal west of the Rocky Mountains, in the more northern interior States, and in the Southeast, and twice

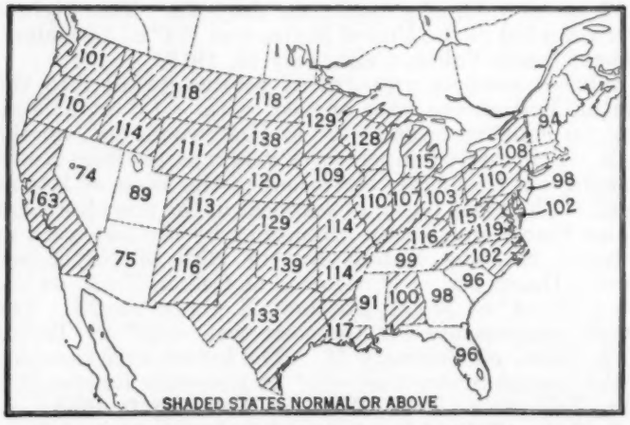

FIGURE 2.—Percentage of normal precipitation, April 1–September 30, 1942.

the normal from Wyoming to central Texas and in the Middle Atlantic States. November was abnormally wet in a large northwestern area, including northern California and also from the central Mississippi Valley and Lake region eastward, while it was abnormally dry in the South and especially in the Southwest. Precipitation during December was below normal in southern Texas and from southern California northeastward over the northern Rocky Mountains and northern Plains States, and above normal in most sections elsewhere.

Annual Temperature Departures (°F.) in the United States, 1942

Annual Precipitation Departures (inches) in the United States, 1942

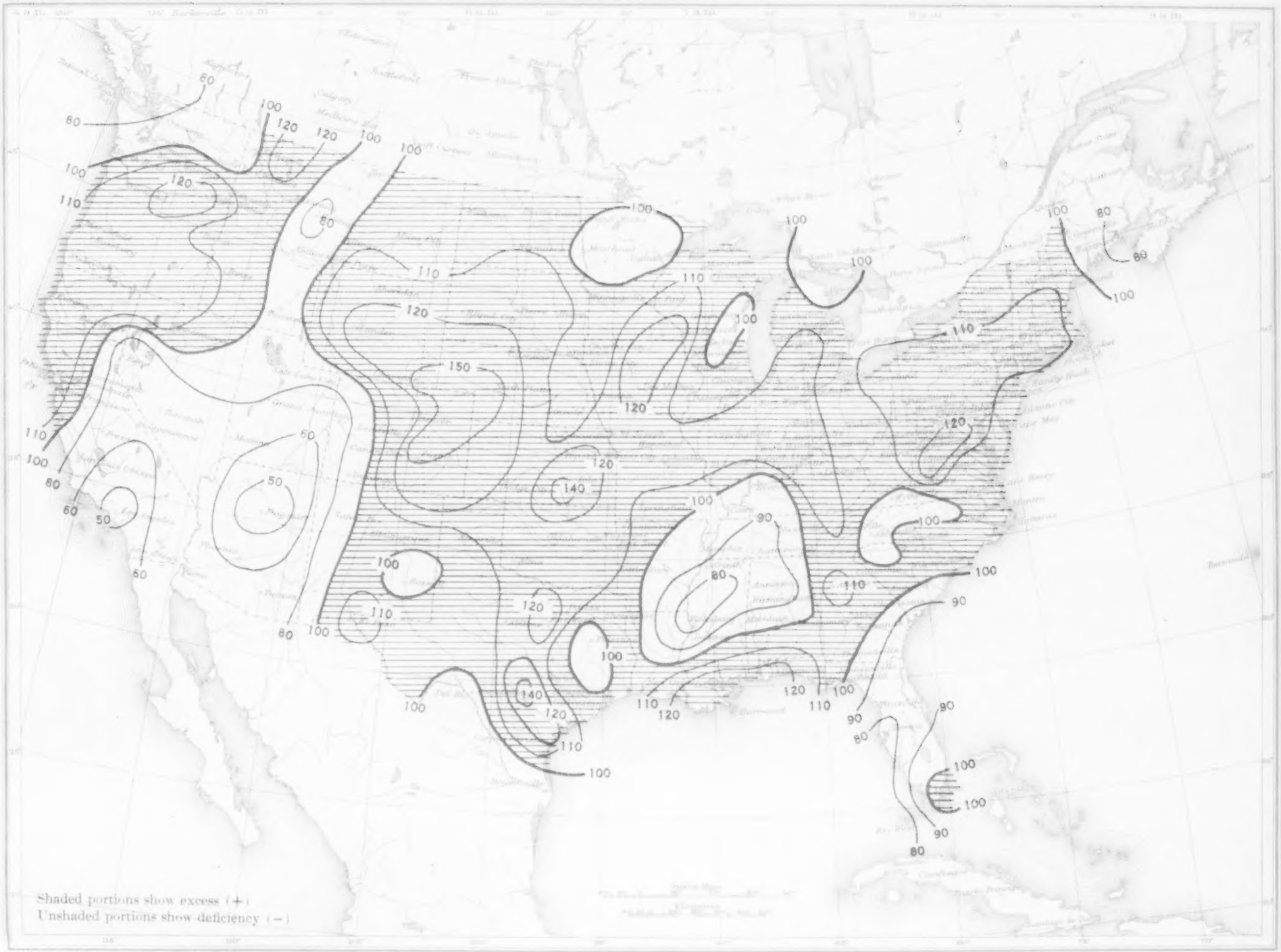

TABLE 1.—*Monthly and annual temperature departures from normal for the year 1942*

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
1. Alabama	−3.2	−4.0	−0.5	+1.1	0.0	+0.4	+0.7	−1.1	−2.3	+1.2	+3.1	+1.8	−0.2
2. Arizona	+.7	−4.6	−3.6	−1.9	−2.3	−1.6	+1.2	−.7	+.1	−.1	+2.8	+3.0	−0.6
3. Arkansas	−3.1	−2.3	+.4	+1.3	−1.1	−.1	+.6	−1.3	−3.1	.0	+3.2	−0.2	−0.5
4. California	+1.1	−2.6	−1.2	−2.1	−2.9	−1.4	+.2	+.2	−.7	+1.0	−.3	+0.8	−0.7
5. Colorado	−1.8	−6.1	−3.2	+2.6	−.4	−.6	+.8	.0	−.4	+.7	+2.4	+3.0	−0.2
6. Florida	−2.1	−5.4	−2.2	−.9	−.3	+.3	+1.9	+.3	+.6	.0	+2.2	+2.5	−0.3
7. Georgia	−1.4	−4.8	−1.2	+.7	−.3	+.4	+1.2	−1.0	−1.2	.0	+2.2	+0.3	−0.4
8. Idaho	−4.1	−4.2	−3.1	+1.4	−3.5	−3.5	+1.0	+.6	+1.4	+1.2	−1.0	+1.8	−1.0
9. Illinois	+.2	−1.2	+3.3	+3.7	+.2	+.3	+.3	−1.1	−2.2	+.4	+2.7	−4.0	+0.2
10. Indiana	−.4	−2.2	+2.7	+4.3	+1.2	+.8	+.5	−.6	−2.1	+1.0	+2.8	−4.2	+0.3
11. Iowa	+3.0	+1.1	+3.7	+6.0	−.9	+.1	−.4	.0	−2.5	+1.4	+2.5	−3.9	+0.8
12. Kansas	+.5	−.7	+1.0	+3.3	−.8	−1.1	+.8	−1.0	−3.2	+.5	+2.2	−.8	+0.1
13. Kentucky	−3.0	−2.9	+2.1	+2.0	.0	+.8	+1.0	−.9	−2.9	+.3	+3.4	−1.6	−0.1
14. Louisiana	−3.8	−3.6	−2.3	.0	−.4	−1.6	.0	.0	−2.6	+.4	+2.9	+0.8	−0.8
15. Maryland-Delaware	−.9	−1.2	+2.0	+3.4	+3.6	+1.4	+.8	−.7	+.5	+1.6	+2.0	−3.1	+0.8
16. Michigan	+.6	−.5	+3.8	+6.2	+.7	+.3	−1.2	+.1	−2.3	+.5	+.2	−3.6	+0.4
17. Minnesota	+8.2	+3.9	+6.5	+6.0	−2.5	−1.7	−2.1	.0	−4.3	+.9	+.3	−4.5	+0.9
18. Mississippi	−3.8	−3.9	−.9	+.9	−.5	+.4	+.9	−.9	−2.3	+1.0	+3.6	+0.7	−0.4
19. Missouri	+.4	−.1	+1.8	+3.8	−.7	−.3	+.7	−1.4	−2.0	+.3	+3.5	−1.6	+0.4
20. Montana	−.1	−2.1	+1.4	+2.8	−2.8	−3.8	−.3	+.2	+.8	+1.6	−1.3	+1.8	−0.2
21. Nebraska	+1.7	−1.2	+1.0	+4.4	−2.1	−1.2	+1.0	+.5	−3.3	+1.0	+1.8	+.9	+0.4
22. Nevada	+.4	−2.4	−1.4	+.8	−2.3	−.1	+3.4	+2.1	+1.7	+3.0	+2.0	+5.5	+1.0
23. New England	−.9	−1.0	+4.5	+2.6	+3.3	+.9	−.6	+.6	+.5	+1.3	.0	−4.4	+0.6
24. New Jersey	−2.0	−.9	+3.0	+3.5	+3.9	+.8	+.8	−.7	+.3	+1.5	+1.2	−3.8	+0.6
25. New Mexico	+.5	−3.2	−3.3	+.1	−.7	.0	+3.2	−.4	−1.2	−.6	+3.4	+4.1	+0.2
26. New York	−.7	−1.9	+4.4	+4.6	+3.6	+1.2	−.1	.0	.0	+2.0	+.8	−4.1	+0.8
27. North Carolina	−1.8	−4.8	+1.1	+2.3	+1.1	+1.6	+1.6	−.7	+.4	+.9	+1.9	−1.7	+0.2
28. North Dakota	+11.8	+4.4	+6.1	+3.4	−3.6	−2.9	−1.9	−.2	−2.8	+2.5	+1.3	−2.4	+1.3
29. Ohio	+.1	−2.4	+3.4	+4.6	+1.9	+1.6	+1.0	−.4	−1.1	+1.7	+2.1	−4.0	+0.7
30. Oklahoma	−1.2	−.2	−.1	+1.9	−.9	−.2	−.3	−1.6	−3.1	−.9	+3.1	+0.8	−0.2
31. Oregon	−3.6	−1.3	−1.4	+.6	−2.7	−2.8	+.9	+.8	+1.4	+1.8	−.4	+2.6	−0.3
32. Pennsylvania	−1.7	−2.6	+2.5	+4.2	+2.8	+.9	+.4	−.8	−.5	+1.3	+.4	−4.0	+0.2
33. South Carolina	−1.0	−5.5	+.3	+1.9	+.1	+1.2	+1.7	−.7	+.6	+1.0	+2.4	−1.1	+0.1
34. South Dakota	+6.7	+2.1	+2.7	+4.9	−3.8	−2.3	−1.5	+.3	−4.1	+1.0	+1.7	−0.7	+0.6
35. Tennessee	−3.0	−3.8	+1.2	+2.1	+.8	+1.6	+2.1	−1.0	−1.9	+.8	+3.8	−0.8	+0.2
36. Texas	−2.8	−2.2	−1.8	−.2	−.4	+.2	−1.4	−1.1	−3.4	−.8	+3.1	+2.0	−0.7
37. Utah	−2.2	−5.6	−4.8	+.8	−3.4	−1.5	+1.5	+.3	+.2	+1.8	+.9	+4.1	−0.7
38. Virginia	−1.7	−2.8	+1.5	+3.3	+2.8	+1.5	+1.7	−.7	+.1	+1.2	+2.1	−1.6	+0.6
39. Washington	−1.7	+2.0	−.1	+1.5	−1.1	−1.9	+1.8	+2.8	+2.4	+1.6	−2.1	+0.9	+0.5
40. West Virginia	−1.9	−4.0	+1.7	+2.9	+1.8	+1.7	+.7	−.7	−1.3	+1.1	+1.5	−3.2	0.0
41. Wisconsin	+3.1	+1.7	+4.5	+6.3	−1.1	−.4	−1.2	.0	−3.1	+.5	+.4	−4.2	+0.5
42. Wyoming	−2.8	−5.2	−1.4	+4.0	−2.6	−3.1	+1.4	+1.2	−.2	+1.3	+.9	+3.6	−0.2

TABLE 2.—*Percentage of normal precipitation 1942*

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
1. Alabama	68	88	125	40	87	133	87	137	125	73	55	166	101
2. Arizona	50	81	47	204	0	0	64	82	64	113	12	84	70
3. Arkansas	72	85	84	175	80	112	37	167	105	106	97	118	104
4. California	86	88	54	234	175	19	14	178	15	49	164	90	100
5. Colorado	87	116	91	244	49	149	64	82	115	206	71	99	114
6. Florida	137	146	195	92	84	153	66	77	101	29	34	125	101
7. Georgia	104	92	165	38	123	113	82	109	125	77	64	152	106
8. Idaho	62	92	46	106	196	119	84	37	53	91	210	159	112
9. Illinois	62	163	92	76	104	140	152	106	84	76	192	129	113
10. Indiana	56	140	108	82	101	143	121	109	82	64	158	89	105
11. Iowa	70	107	114	38	117	137	139	89	110	70	107	142	106
12. Kansas	54	117	101	177	66	166	72	146	162	149	58	217	125
13. Kentucky	65	74	95	75	92	134	115	175	107	108	141	142	109
14. Louisiana	56	117	118	109	102	172	76	119	133	96	30	99	103
15. Maryland-Delaware	73	67	159	31	104	101	106	167	87	219	91	122	111
16. Michigan	90	57	167	53	135	112	128	101	148	112	107	148	115
17. Minnesota	24	39	202	96	175	90	102	147	165	59	43	116	117
18. Mississippi	52	87	111	72	84	102	57	137	111	113	39	135	91
19. Missouri	67	145	64	98	113	166	80	111	105	106	160	187	115
20. Montana	61	97	79	91	182	123	88	88	86	99	189	107	114
21. Nebraska	52	134	155	126	129	145	52	89	194	62	58	100	114
22. Nevada	82	80	63	118	110	49	26	66	7	72	200	95	86
23. New England	85	83	165	57	89	132	115	74	97	90	138	141	106
24. New Jersey	82	76	150	38	65	81	155	175	118	95	130	127	110
25. New Mexico	42	74	64	345	23	67	61	140	142	155	3	174	109
26. New York	67	88	142	77	118	87	129	94	142	102	121	185	112
27. North Carolina	67	90	130	30	128	103	87	122	132	141	66	141	104
28. North Dakota	18	73	244	138	137	90	98	158	114	45	31	106	111
29. Ohio	48	105	95	84	109	108	105	102	107	82	137	138	101
30. Oklahoma	51	102	61	250	49	180	53	159	160	135	81	163	125
31. Oregon	68	101	44	92	190	129	100	60	25	69	213	175	116
32. Pennsylvania	56	90	120	64	146	93	120	108	127	142	116	164	112
33. South Carolina	74	92	187	43	125	104	104	99	84	59	70	122	99
34. South Dakota	11	93	177	143	209	129	102	95	139	68	61	57	126
35. Tennessee	80	92	94	59	77	89	109	169	94	111	77	169	101
36. Texas	35	70	57	187	73	109	135	179	137	136	53	90	109
37. Utah	81	102	94	138	112	47	86	67	54	88	202	98	99
38. Virginia	77	58	114	20	127	126	92	193	136	207	68	133	115
39. Washington	52	75	63	79	149	164	171	42	15	95	151	104	95
40. West Virginia	55	69	95	53	113	117	97	176	129	142	138	169	112
41. Wisconsin	49	42	126	69	180	118	124	80	177	77	105	139	116
42. Wyoming	60	82	57	150	147	91	79	60	105	166	241	89	111

TABLE 3.—*Monthly and annual precipitation (inches), 1942*

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
1. Alabama	3.37	4.73	7.28	1.80	3.40	5.72	4.83	6.43	4.08	1.99	1.77	8.12	53.52
2. Arizona	0.62	1.08	0.48	1.16	T	T	1.33	1.86	0.82	0.93	0.11	1.08	9.47
3. Arkansas	3.20	2.97	3.95	8.42	3.89	4.54	1.39	5.96	3.52	3.19	3.83	4.87	49.73
4. California	4.17	3.80	1.98	3.98	1.75	0.06	0.01	0.16	0.07	0.60	3.78	3.64	24.00
5. Colorado	0.69	1.13	1.17	4.35	0.90	2.07	1.41	1.59	1.58	2.33	0.55	0.88	18.65
6. Florida	3.79	4.55	6.13	2.63	3.37	10.32	4.85	5.39	6.75	1.20	0.74	3.45	53.17
7. Georgia	4.46	4.53	8.10	1.38	4.29	5.05	4.79	5.76	4.61	2.08	1.68	6.29	53.02
8. Idaho	1.38	1.60	0.82	1.52	3.14	1.60	0.54	0.22	0.54	1.32	4.09	3.35	20.12
9. Illinois	1.47	3.21	2.91	2.62	4.19	5.46	4.89	3.56	3.05	1.91	5.12	2.77	41.16
10. Indiana	1.79	3.40	4.00	2.92	4.04	5.55	4.03	3.71	2.71	1.73	4.83	2.48	41.19
11. Iowa	0.76	1.15	1.96	1.06	4.70	5.93	4.89	3.17	4.13	1.53	1.76	1.59	32.63
12. Kansas	0.37	1.17	1.45	4.47	2.53	6.49	2.25	4.57	4.48	2.80	0.75	1.82	33.15
13. Kentucky	2.93	2.62	4.44	3.01	3.62	5.54	4.71	6.56	3.12	2.81	4.88	5.34	49.58
14. Louisiana	2.73	5.27	5.48	5.10	4.56	8.40	4.63	6.15	5.09	3.10	1.17	5.16	56.84
15. Maryland-Delaware	2.47	2.13	5.89	1.10	3.88	3.91	4.69	7.34	2.99	6.60	2.40	3.78	47.18
16. Michigan	1.82	1.00	3.44	1.26	4.32	3.45	3.46	2.80	4.69	2.99	2.68	3.06	34.97
17. Minnesota	0.19	0.30	2.34	2.06	5.52	3.60	3.35	4.67	4.55	1.08	0.49	0.93	29.08
18. Mississippi	2.70	4.27	6.31	3.52	3.61	4.42	2.87	5.71	3.38	2.91	1.40	7.12	48.22
19. Missouri	1.66	3.00	2.05	3.83	5.31	7.70	2.85	4.24	4.19	2.97	4.30	4.01	46.11
20. Montana	0.53	0.69	0.74	1.04	3.76	3.16	1.25	0.93	1.13	1.01	1.72	0.92	16.88
21. Nebraska	0.27	0.95	1.70	2.99	4.25	5.12	1.54	2.46	3.94	0.86	0.44	0.65	25.17
22. Nevada	0.99	0.84	0.61	0.91	0.92	0.24	0.10	0.31	0.03	0.43	1.28	0.94	7.60
23. New England	3.03	2.68	6.04	1.94	2.98	4.54	4.32	2.83	3.68	3.12	4.80	4.74	44.70
24. New Jersey	2.98	2.69	5.73	1.39	2.41	3.11	7.30	8.24	4.55	3.43	4.14	4.53	50.50
25. New Mexico	0.25	0.54	0.48	2.97	0.27	0.84	1.51	3.34	2.46	1.72	0.02	1.22	15.62
26. New York	2.01	2.42	4.36	2.32	4.03	3.00	5.04	3.53	4.98	3.32	3.75	5.43	44.19
27. North Carolina	2.53	3.63	5.44	1.10	5.21	4.84	5.14	6.89	5.18	4.61	1.76	5.36	51.69
28. North Dakota	0.09	0.36	1.83	1.96	3.03	3.12	2.43	3.09	1.67	0.46	0.18	0.53	18.75
29. Ohio	1.48	2.66	3.30	2.70	3.96	4.19	3.98	3.48	3.18	2.03	3.72	3.75	38.43
30. Oklahoma	0.74	1.40	1.29	8.31	2.21	6.69	1.49	4.78	4.91	3.87	1.64	2.63	39.96
31. Oregon	2.75	3.19	1.25	1.86	3.27	1.65	0.43	0.24	0.30	1.38	7.70	7.07	31.09
32. Pennsylvania	1.81	2.64	4.20	2.21	5.62	3.83	5.15	4.50	4.37	4.50	3.35	5.06	47.24
33. South Carolina	2.66	3.90	7.17	1.40	4.46	5.00	6.06	5.68	3.36	1.72	1.64	4.29	47.34
34. South Dakota	0.06	0.53	1.93	2.95	5.86	4.27	2.52	2.08	2.05	0.76	0.38	0.32	23.71
35. Tennessee	3.87	4.02	5.10	2.60	3.20	3.73	4.84	6.88	2.82	3.04	2.74	7.64	50.48
36. Texas	0.66	1.27	1.15	5.50	2.65	3.39	3.53	4.32	4.06	3.46	1.20	2.04	33.23
37. Utah	0.98	1.30	1.30	1.60	1.28	0.27	0.75	0.66	0.55	0.94	1.82	1.10	12.55
38. Virginia	2.54	1.82	4.21	0.66	4.97	5.29	4.28	8.71	4.39	6.34	1.71	4.04	48.96
39. Washington	2.56	2.77	2.14	1.90	2.94	2.86	1.28	0.33	0.26	2.82	7.57	5.91	33.34
40. West Virginia	2.02	2.22	3.64	1.86	4.61	5.17	4.44	7.22	3.97	4.04	3.81	5.42	48.42
41. Wisconsin	0.69	0.55	2.28	1.72	6.37	4.66	4.27	2.63	6.40	1.89	1.96	1.90	35.32
42. Wyoming	0.49	0.64	0.64	2.32	2.97	1.43	1.07	0.65	1.17	1.79	1.64	0.65	15.46

METEOROLOGICAL AND CLIMATOLOGICAL DATA FOR DECEMBER 1942

[Climate and Crop Weather Division, J. B. KINCER, in charge]

AEROLOGICAL OBSERVATIONS

NOTICE.—Effective with this issue (December 1942) the publication of table 1 (RAOB summaries) has been discontinued indefinitely.—EDITOR

TABLE 2.—*Free-air resultant winds based on pilot-balloon observations made near 5 p. m. (75th meridian time) during December 1942. Directions given in degrees from North (N=360°, E=90°, S=180°, W=270°). Velocities in meters per second*

Altitude (meters) m. s. l.	Abilene, Tex. (538 m.)			Albuquerque, N. Mex. (1,630 m.)			Atlanta, Ga. (299 m.)			Billings, Mont. (1,095 m.)			Bismarck, N. Dak. (512 m.)			Boise, Idaho (870 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	29	251	1.5	31	291	2.2	22	291	3.3	30	262	4.8	29	287	0.2	22	107	1.9
500							22	289	5.3							31	146	3.9
1,000	29	228	2.9				20	292	6.4				29	276	4.4	22	113	2.6
1,500	26	260	7.0				19	289	10.2	30	267	8.8	24	278	6.7	21	199	2.6
2,000	26	265	8.7	31	287	3.0	18	286	14.0	30	281	10.0	18	276	10.3	18	240	5.5
2,500	26	270	9.6	31	294	5.0	17	280	15.6	30	286	11.3	17	291	13.9	15	256	9.3
3,000	26	274	11.2	31	299	7.6	15	282	17.0	29	286	12.6	15	294	14.8	13	268	9.5
4,000	24	280	14.0	26	295	10.4	14	277	19.2	23	288	15.5	12	291	19.0			
5,000	22	279	18.0	22	299	13.8	13	279	23.4	16	300	20.9	10	296	22.2			
6,000	19	281	19.3	22	294	14.9	10	275	25.4	13	307	23.4						
8,000	17	284	21.3	18	298	14.7												
10,000	15	283	26.5	10	291	22.2												
12,000	13	280	34.0															
14,000																		

Altitude (meters) m. s. l.	Brownsville, Tex. (7 m.)			Buffalo, N. Y. (220 m.)			Burlington, Vt. (132 m.)			Charleston, S. C. (17 m.)			Cincinnati, Ohio (152 m.)			Denver, Colo. (1,627 m.)			El Paso, Tex. (1,196 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	31	122	1.8	23	254	2.6	27	256	1.6	24	258	1.3	26	269	1.2	30	317	1.2	30	267	3.6
500	31	146	3.9	23	250	5.5	27	256	5.0	24	214	2.3	26	234	2.9						
1,000	26	192	2.2	11	281	7.0	23	267	7.8	23	248	4.7	19	246	5.5						
1,500	23	269	2.0				17	289	11.0	21	275	5.4	15	251	6.8				30	266	4.1
2,000	19	284	5.1				11	292	8.7	19	277	11.8	12	274	8.6	30	305	3.1	30	273	5.2
2,500	18	281	7.3							17	279	15.1				30	284	4.8	29	283	8.1
3,000	18	273	8.8							17	281	17.0				30	286	7.8	26	284	10.6
4,000	15	262	10.8							13	277	20.7				29	301	11.4	24	289	12.0
5,000	14	255	13.2							13	276	23.4				24	297	13.0	22	290	11.4
6,000	14	255	14.2							11	271	26.2				21	299	16.0	22	288	14.0
8,000	14	260	22.0													17	288	21.6	15	297	14.5
10,000	11	259	24.2																		
12,000																					
14,000																					

Altitude (meters) m. s. l.	Ely, Nev. (1,910 m.)			Grand Junction, Colo. (1,413 m.)			Greensboro, N. C. (271 m.)			Havre, Mont. (767 m.)			Jacksonville, Fla. (16 m.)			Joliet, Ill. (178 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	31	300	1.4	31	343	0.8	24	274	1.2	30	258	2.2	27	82	0.4	26	275	2.9
500							24	252	2.6				26	245	2.2	26	273	5.2
1,000							23	262	5.3	30	259	5.8	24	262	3.8	19	263	5.8
1,500				31	346	0.6	23	268	9.5	30	277	10.3	23	273	6.7	17	276	8.6
2,000	31	299	1.4	31	269	0.7	22	273	13.2	29	282	11.2	23	270	8.8	16	280	11.9
2,500	31	282	2.2	31	249	2.9	18	273	17.1	29	286	12.3	20	268	11.0			
3,000	31	288	4.2	31	265	5.6	16	278	21.2	25	288	13.2	19	269	11.5			
4,000	28	284	9.8	26	292	9.9	14	278	26.3	18	287	15.1	16	278	15.4			
5,000	26	279	13.3	21	293	12.7	12	277	32.0				16	269	19.3			
6,000	25	287	15.0	17	290	13.3							14	267	20.0			
8,000	18	297	16.0															
10,000	16	298	18.6															
12,000	12	288	15.7															
14,000																		

Altitude (meters) m. s. l.	Las Vegas, Nev. (573 m.)			Little Rock, Ark. (88 m.)			Medford, Oreg. (410 m.)			Miami, Fla. (15 m.)			Mobile, Ala. (66 m.)			Nashville, Tenn. (194 m.)			New York, N. Y. (15 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	31	78	1.5	27	1	0.3	21	21	0.8	31	118	1.6	28	238	1.0	25	261	0.8	27	291	4.4
500				27	293	1.4	21	136	0.1	31	94	3.6	28	250	2.1	25	231	2.1	27	280	5.6
1,000	31	65	1.5	19	278	4.9	21	220	3.8	31	127	2.8	21	297	6.0	20	246	6.3	23	299	8.0
1,500	31	285	0.8	18	290	6.4	21	242	7.5	27	206	2.6	21	288	9.2	17	269	7.6	19	306	12.7
2,000	31	276	2.3	15	289	9.4	20	247	9.7	25	231	3.3	20	280	11.0	14	280	11.7	10	294	11.8
2,500	31	303	3.0	12	278	11.8				22	234	5.1	18	275	12.0	13	282	15.6			
3,000	30	313	4.0	12	273	12.5				19	246	5.6	16	272	14.2	12	285	17.3			
4,000	29	298	6.3	11	287	15.8				17	248	8.5	14	271	17.2						
5,000	26	299	9.8							14	261	10.1	12	278	20.2						
6,000	25	297	10.9							11	266	13.6									
8,000	24	298	17.2																		
10,000	23	298	18.4																		
12,000	19	279	21.6																		
14,000	14	282	23.4																		

TABLE 2.—*Free-air resultant winds based on pilot-balloon observations made near 5 p. m. (75th meridian time) during December 1942. Directions given in degrees from North (N=360°, E=90°, S=180°, W=270°). Velocities in meters per second*—Continued

Altitude (meters) m. s. l.	Oakland, Calif. (8 m.)			Oklahoma City, Okla. (402 m.)			Omaha, Nebr. (306 m.)			Phoenix, Ariz. (388 m.)			Rapid City, S. Dak. (982 m.)			St. Louis, Mo. (181 m.)			St. Paul, Minn. (225 m.)			San Antonio, Tex. (240 m.)			San Diego, Calif. (15 m.)			Sault Ste. Marie, Mich. (230 m.)			Seattle, Wash. (12 m.)			Spokane, Wash. (603 m.)			Washington, D. C. (24 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	28	247	1.5	23	266	0.2	27	311	1.8	31	266	0.5	27	354	2.2	27	264	1.1	27	279	1.7	31	166	1.0	30	280	2.9	18	302	1.8	27	193	2.9	22	193	1.2	24	289	2.9
500	28	3	0.8	23	208	0.6	27	287	1.4	31	260	0.7	---	---	---	---	---	---	27	294	2.5	31	195	1.0	30	287	2.4	18	333	2.8	24	202	6.4	---	---	---	24	278	4.9
1,000	25	302	2.7	22	233	2.2	22	316	3.7	31	243	0.4	27	352	2.3	25	287	5.7	20	305	5.6	29	247	2.9	29	335	0.6	16	350	3.9	20	213	7.1	22	204	3.4	21	280	8.9
1,500	23	312	4.2	20	263	6.8	17	311	7.4	31	255	1.4	27	305	5.7	20	275	9.1	17	307	8.9	27	270	5.5	27	21	1.7	11	346	5.8	15	222	7.0	15	222	6.0	19	288	11.6
2,000	21	319	6.1	19	279	10.0	14	303	11.1	31	271	1.9	26	300	9.0	19	281	12.4	15	308	10.9	26	273	7.5	26	357	2.4	---	---	---	11	246	6.1	11	248	6.5	16	295	15.4
2,500	16	318	7.6	19	277	11.4	14	300	13.6	30	291	2.5	26	303	12.7	18	290	14.0	14	311	12.2	23	275	8.9	26	339	3.1	---	---	---	---	---	---	---	---	---	16	292	17.7
3,000	16	307	10.1	19	279	13.5	14	298	16.5	30	299	4.7	26	303	13.7	18	288	16.8	13	310	14.9	23	277	10.4	26	321	3.7	---	---	---	---	---	---	---	---	---	15	279	18.1
4,000	13	325	12.6	19	283	15.9	12	299	20.8	28	304	7.1	23	292	15.3	17	287	20.1	---	---	---	23	273	14.0	24	292	4.8	---	---	---	---	---	---	---	---	---	11	279	25.0
5,000	13	322	15.0	17	284	18.7	10	297	25.4	28	302	9.3	17	289	17.4	16	284	25.3	---	---	---	20	274	15.3	20	318	5.6	---	---	---	---	---	---	---	---	---	---	---	---
6,000	12	304	14.0	14	293	21.3	---	---	---	26	314	12.1	14	285	18.8	14	279	27.5	---	---	---	19	272	17.7	17	294	8.8	---	---	---	---	---	---	---	---	---	---	---	---
8,000	---	---	---	14	290	26.4	---	---	---	23	309	14.0	---	---	---	---	---	---	---	---	---	14	276	21.8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
10,000	---	---	---	12	290	29.3	---	---	---	19	298	18.8	---	---	---	---	---	---	---	---	---	10	280	22.1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
12,000	---	---	---	11	283	35.5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14,000	---	---	---	10	284	31.7	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

TABLE 3.—*Maximum free-air wind velocities (M. P. S.), for different sections of the United States based on pilot-balloon observations during December 1942*

Section	Surface to 2,500 meters (m. s. l.)					Between 2,500 and 5,000 meters (m. s. l.)					Above 5,000 meters (m. s. l.)				
	Maximum velocity	Direction	Altitude (m) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m) m. s. l.	Date	Station
Northeast [1]	44.8	WNW	1,740	19	Portland, Maine	51.0	WNW	5,000	4	Columbus, Ohio	60.0	WNW	8,110	10	Caribou, Maine.
East-Central [2]	48.8	W	2,370	17	Knoxville, Tenn	73.1	W	4,950	2	Greensboro, N. C	74.6	NNE	6,320	4	Washington, D. C.
Southeast [3]	42.8	W	1,960	17	Spartanburg, S. C	46.5	W	3,890	2	Tallahassee, Fla	61.8	SSW	11,610	14	Jacksonville, Fla.
North-Central [4]	69.0	NNE	2,120	12	Sault Ste. Marie, Mich	60.4	NW	5,000	18	International Falls, Minn.	72.0	NW	8,150	20	Detroit, Mich.
Central [5]	46.0	WNW	2,500	11	Moline, Ill	52.4	WNW	2,620	11	Moline, Ill	68.0	NNW	9,280	17	St. Louis, Mo.
South-Central [6]	32.8	SW	1,690	9	Oklahoma City, Okla	56.0	WNW	5,000	1	Abilene, Tex	73.0	{W / W	{13,480 / 11,110	30	Oklahoma City, Okla.
Northwest [7]	39.2	WNW	2,120	16	Havre, Mont	63.0	WNW	4,130	16	Butte, Mont	65.5	NNW	8,200	25	Burns, Oreg.
West-Central [8]	46.2	NNW	2,440	25	Oakland, Calif	{54.0 / 54.0	WNW / WNW	4,300 / 4,770	31 / 1	Cheyenne, Wyo / Pueblo, Colo	100.0	WNW	9,500	3	Redding, Calif.
Southwest [9]	56.4	NNW	2,110	25	Burbank, Calif	56.0	WNW	4,780	1	Albuquerque, N. Mex	70.1	W	13,800	29	Las Vegas, Nev.

[1] Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, and northern Ohio.
[2] Delaware, Maryland, Virginia, West Virginia, southern Ohio, Kentucky, eastern Tennessee, and North Carolina.
[3] South Carolina, Georgia, Florida, and Alabama.
[4] Michigan, Wisconsin, Minnesota, North Dakota, and South Dakota.
[5] Indiana, Illinois, Iowa, Nebraska, Kansas, and Missouri.
[6] Mississippi, Arkansas, Louisiana, Oklahoma, Texas (except El Paso), and western Tennessee.
[7] Montana, Idaho, Washington, and Oregon.
[8] Wyoming, Colorado, Utah, northern Nevada, and northern California.
[9] Southern California, southern Nevada, Arizona, New Mexico, and extreme west Texas.

DATA FOR YEAR 1942

TABLE 2.—*Free-air resultant winds based on pilot-balloon observations made near 5 p. m. (75th meridian time) during the year 1942. Directions given in degrees from North (N=360°, E=90°, S=180°, W=270°). Velocities in meters per second*

Altitude (meters) m. s. l.	Abilene, Tex. (538 m.)			Albuquerque, N. Mex. (1,630 m.)			Atlanta, Ga. (299 m.)			Billings, Mont. (1,095 m.)			Bismarck, N. Dak. (512 m.)			Boise, Idaho (870 m.)			Brownsville, Tex. (7 m.)			Buffalo, N. Y. (220 m.)			Burlington, Vt. (132 m.)			Charleston, S. C. (17 m.)			Cincinnati, Ohio (152 m.)			Denver, Colo. (1,627 m.)			El Paso, Tex. (1,196 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	358	190	2.3	365	240	1.7	345	276	1.6	352	276	1.9	355	283	1.6	338	325	2.1	355	122	4.0	336	247	3.2	346	232	1.0	346	192	1.2	350	242	1.2	347	72	1.3	363	241	1.9
500	---	---	---	---	---	---	345	272	2.1	---	---	---	---	---	---	---	---	---	354	130	4.9	336	249	4.9	346	241	2.9	346	209	2.2	350	240	2.8	---	---	---	---	---	---
1,000	357	189	3.1	---	---	---	341	271	2.7	---	---	---	354	283	2.7	338	317	2.1	306	145	3.0	287	251	6.6	329	257	4.2	336	245	2.9	329	244	4.2	---	---	---	---	---	---
1,500	347	210	3.8	---	---	---	328	275	4.0	352	279	3.8	320	283	4.1	337	294	2.1	282	178	1.7	237	255	6.6	298	268	6.1	322	267	4.3	299	257	5.4	---	---	---	363	243	2.3
2,000	336	231	4.7	365	247	2.5	311	281	5.5	347	286	4.7	277	280	6.3	328	275	2.7	250	221	1.3	208	266	7.5	233	275	7.0	296	273	5.7	263	267	7.0	347	53	1.0	363	249	2.7
2,500	314	251	5.5	364	257	3.4	289	282	6.6	338	282	6.2	240	287	7.9	309	271	4.0	229	248	1.9	168	277	7.9	167	285	8.2	283	271	7.1	213	274	8.0	339	306	.4	358	257	3.8
3,000	298	261	7.0	364	267	4.5	270	282	7.8	313	278	7.6	218	288	9.5	292	268	4.8	206	259	3.0	---	---	---	---	---	---	269	269	7.8	187	279	8.6	330	276	2.6	347	264	5.1
4,000	272	270	9.6	332	279	7.5	241	280	9.2	269	279	10.2	182	288	12.1	251	262	6.1	174	265	4.6	---	---	---	---	---	---	237	269	10.2	---	---	---	298	283	7.2	324	272	7.3
5,000	249	272	11.4	304	278	10.0	206	279	12.2	226	282	11.5	155	290	13.7	218	270	7.7	160	263	5.6	---	---	---	---	---	---	195	271	11.6	---	---	---	265	285	10.7	307	273	9.1
6,000	225	273	13.0	280	276	12.0	179	279	13.7	193	287	12.3	---	---	---	199	275	9.3	149	266	6.8	---	---	---	---	---	---	167	271	13.1	---	---	---	220	287	13.1	280	274	10.7
8,000	185	276	15.7	221	276	13.2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	157	279	15.2	229	276	13.3
10,000	147	276	18.6	173	275	16.0	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	171	277	15.4
12,000	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14,000	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

TABLE 2.—*Free-air resultant winds based on pilot-balloon observations made near 5 p. m. (75th meridian time) during the year 1942. Directions given in degrees from North (N=360°, E=90°, S=180°, W=280°). Velocities in meterf per second*—Continued

Altitude (meters) m. s. l.	Ely, Nev. (1,910 m.)			Grand Junction, Colo. (1,413 m.)			Greensboro, N. C. (271 m.)			Havre, Mont. (767 m.)			Jacksonville, Fla. (16 m.)			Joliet, Ill. (178 m.)			Las Vegas, Nev. (573 m.)			Little Rock, Ark. (88 m.)			Medford, Oreg. (410 m.)			Miami, Fla. (15 m.)			Mobile, Ala. (66 m.)			Nashville, Tenn. (194 m.)			New York, N. Y. (15 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	360	241	1.4	354	299	1.1	337	255	1.2	342	276	2.1	348	83	1.6	334	253	2.0	365	150	1.0	347	189	1.0	341	321	1.4	356	91	2.6	345	187	0.6	352	254	1.2	336	278	1.8
500							337	255	2.3				347	169	0.6	334	250	3.0				347	203	1.7	341	315	1.5	355	92	3.4	344	204	1.0	351	238	2.2	331	268	3.8
1,000							331	257	3.5	342	270	3.7	329	249	1.9	308	248	4.5	365	174	1.4	325	226	2.8	340	267	0.9	347	91	2.1	314	260	1.0	329	241	3.1	312	282	5.5
1,500							326	270	4.9	336	277	5.4	311	269	3.6	279	259	5.8	365	203	1.8	313	250	4.0	334	231	2.3	332	58	0.6	297	290	2.2	316	257	4.1	282	290	7.5
2,000	360	240	1.6	354	284	1.7	299	278	6.4	322	279	6.2	294	275	5.1	240	269	7.6	365	224	2.8	287	261	5.5	323	228	3.2	307	301	0.6	276	286	3.4	280	269	5.3	216	290	8.1
2,500	360	242	2.2	352	262	2.5	278	284	7.8	295	277	8.0	279	275	6.1	197	276	8.8	363	242	3.3	258	266	6.7	288	228	3.0	281	268	1.2	245	278	4.5	258	273	6.7	184	293	8.8
3,000	352	249	2.7	347	254	4.0	262	285	9.4	262	280	8.5	266	273	6.7	169	282	10.8	358	254	3.9	227	273	7.7	260	239	3.0	260	266	1.7	224	276	5.7	230	277	7.9	131	295	9.0
4,000	308	263	4.9	300	266	6.1	244	284	12.3	197	283	10.3	226	274	8.8				344	271	5.6	179	283	9.6	227	263	4.5	227	264	3.3	187	276	8.6	180	283	9.4			
5,000	262	266	7.3	244	278	8.0	217	282	14.4	147	285	11.4	197	273	10.3				323	276	7.8	133	288	11.0	217	269	5.8	198	265	4.7	143	277	10.3	143	281	10.3			
6,000	237	275	9.4	196	281	9.2	202	281	15.9				168	274	12.3				305	280	9.8				193	276	6.9	176	270	6.8				113	281	11.8			
8,000	187	285	12.7				149	281	17.1										271	282	14.2																	
10,000																			239	279	17.6																	
12,000																			200	275	20.6																	
14,000																			160	273	18.4																	

Altitude (meters) m. s. l.	Oakland, Calif. (8 m.)			Oklahoma City, Okla. (402 m.)			Omaha, Nebr. (306 m.)			Phoenix, Ariz. (388 m.)			Rapid City, S. Dak. (982 m.)			St. Louis, Mo. (181 m.)			St. Paul, Minn. (225 m.)			San Antonio, Tex. (240 m.)			San Diego, Calif. (15 m.)			Sault Ste. Marie, Mich. (230 m.)			Seattle, Wash. (12 m.)			Spokane, Wash. (603 m.)			Washington, D. C. (24 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	352	269	3.8	337	189	2.8	345	226	0.9	365	253	0.9	345	342	2.6	344	229	1.7	349	246	1.2	358	129	1.7	345	274	3.5	305	293	1.9	348	231	1.8	332	218	1.2	344	263	1.5
500	352	281	2.2	337	187	3.1	344	218	1.2	365	256	1.5				343	239	2.7	349	248	1.8	358	134	2.4	345	282	2.7	305	287	2.4	345	206	2.3				343	264	2.8
1,000	324	285	2.0	332	196	3.6	328	238	2.2	365	246	1.6	345	340	2.6	320	246	4.0	318	255	2.9	343	153	2.4	318	292	1.1	290	284	3.2	303	206	3.2	332	216	2.4	320	271	4.7
1,500	313	289	2.2	317	222	4.5	305	252	4.0	365	233	1.9	345	316	3.7	303	257	5.8	281	265	4.3	321	192	2.3	307	312	.7	247	291	3.5	270	210	3.5	309	221	3.0	310	279	6.6
2,000	290	293	2.6	300	244	5.5	274	264	5.8	362	236	2.5	330	298	5.0	277	271	7.2	242	280	5.7	301	228	3.0	294	292	.9	221	296	5.1	223	210	3.7	279	234	3.7	278	283	8.5
2,500	274	293	2.9	278	258	7.0	249	274	7.3	356	245	3.2	301	293	7.0	260	275	8.4	198	288	7.4	272	247	4.1	284	277	1.9	185	300	6.7	203	218	4.0	248	244	4.4	250	285	9.9
3,000	269	295	4.0	261	267	8.0	229	280	8.3	355	256	4.0	275	293	8.8	245	278	9.5	172	291	8.7	254	258	5.4	269	277	2.9	153	306	7.5	167	227	4.1	213	251	4.8	222	283	11.2
4,000	256	293	5.2	240	276	10.0	201	287	10.1	342	267	5.4	235	290	10.9	209	285	11.2				220	270	7.6	240	270	4.6										165	262	6.6	187	285	13.6
5,000	238	294	7.0	222	281	11.8	173	291	11.8	320	270	7.1	193	287	12.1	177	288	13.7				188	273	9.4	207	271	5.8										135	273	8.1	157	282	16.5
6,000	220	290	8.2	200	284	13.1	166	290	13.6	307	274	8.6	165	289	13.4	147	288	15.0				173	275	10.8	168	266	6.5													138	284	18.8
8,000										267	278	11.6	127	293	16.3							130	283	12.9															
10,000										221	273	15.3																											
12,000										179	275	18.3																											
14,000																																						

TABLE 3.—*Maximum free-air wind velocities (M. P. S.), for different sections of the United States based on pilot-balloon observations during year 1942*

Section	Surface to 2,500 meters (m. s. l.)					Between 2,500 and 5,000 meters (m. s. l.)					Above 5,000 meters (m. s. l.)				
	Maximum velocity	Direction	Altitude (m) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m) m. s. l.	Date	Station
Northeast [1]	59.0	wsw.	1,810	Jan. 17	Binghamton, N. Y.	58.0	nw.	2,980	Nov. 28	Boston, Mass.	90.8	w.	9,740	Feb. 18	Portland, Maine.
East-Central [2]	49.3	w.	2,240	Mar. 22	Huntington, W. Va.	73.1	w.	4,950	Dec. 2	Greensboro, N. C.	80.2	wnw.	7,920	Feb. 13	Hatteras, N. C.
Southeast [3]	42.8	w.	1,960	Dec. 17	Spartanburg, S. C.	60.0	wnw.	4,420	Mar. 3	Jacksonville, Fla.	69.2	sw.	11,320	Jan. 11	Jacksonville, Fla.
North-Central [4]	69.0	nne.	2,120	Dec. 12	Sault Ste. Marie, Mich.	60.4	nw.	5,000	Dec. 18	International Falls, Minn.	74.4	nw.	10,370	Nov. 8	Detroit, Mich.
Central [5]	46.0	wnw.	2,500	Dec. 11	Moline, Ill.	66.2	wnw.	4,150	Jan. 7	Wichita, Kans.	77.2	w.	9,020	Jan. 5	Wichita, Kans.
South-Central [6]	45.3	wsw.	2,310	Apr. 30	Big Spring, Tex.	56.0	wnw.	5,000	Dec. 1	Abilene, Tex.	83.7	wnw.	13,460	Feb. 21	Abilene, Tex.
Northwest [7]	43.4	wsw.	2,110	Mar. 5	Great Falls, Mont.	63.0	wnw.	4,130	Dec. 16	Butte, Mont.	77.4	n.	9,310	Mar. 14	Tatoosh Island, Wash.
West-Central [8]	46.2	nnw.	2,440	Dec. 25	Oakland, Calif.	59.8	ssw.	2,840	Sept. 9	Modena, Utah	100.0	wnw.	9,500	Dec. 3	Redding, Calif.
Southwest [9]	56.4	nnw.	2,110	..do.	Burbank, Calif.	65.5	wsw.	5,000	Feb. 22	Roswell, N. Mex.	91.0	w.	10,990	Feb. 23	Las Vegas, Nev.

[1] Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, and northern Ohio.
[2] Delaware, Maryland, Virginia, West Virginia, southern Ohio, Kentucky, eastern Tennessee, and North Carolina.
[3] South Carolina, Georgia, Florida, and Alabama.
[4] Michigan, Wisconsin, Minnesota, North Dakota, and South Dakota.
[5] Indiana, Illinois, Iowa, Nebraska, Kansas, and Missouri.
[6] Mississippi, Arkansas, Louisiana, Oklahoma, Texas (except El Paso), and western Tennessee.
[7] Montana, Idaho, Washington, and Oregon.
[8] Wyoming, Colorado, Utah, northern Nevada, and northern California.
[9] Southern California, southern Nevada, Arizona, New Mexico, and extreme west Texas.

RIVER STAGES AND FLOODS

By BENNETT SWENSON

Extensive flooding, mostly confined to the latter part of December, covered most of the eastern half of the country and Oregon. The principal features were: (1) the damaging floods in the upper Ohio River basin and below, including floods in the Tennessee and Cumberland Rivers and tributaries to the Ohio in West Virginia and Kentucky; (2) damaging floods in the Willamette River in Oregon; (3) considerable flooding in Alabama, Oklahoma, Arkansas, Kansas, Missouri, central New York and eastern Pennsylvania.

St. Lawrence drainage.—A general break-up of ice in the rivers in lower Michigan and in northern Indiana and Ohio during the latter part of December was followed by high water and some flooding. Precipitation had been above normal in October and November and in the form of rain until the close of November when heavy snow occurred. The weather remained cold in December until the 23d, and practically all of the streams froze over. Mild temperatures followed and continued until the end of the month. Heavy rains, approximating 2 inches, fell on the 26–27th.

The combined action of the mild temperature and the heavy rains melted the snow-cover and removed the frost in the ground. A high rate of run-off resulted in rapidly rising stages and several ice jams were formed. No material damage was reported from the overflows.

Atlantic Slope drainage.—The rivers in Maine were below the normal stage and the ice was unusually thick, 15 to 18 inches from Lewiston to Rumford, Maine. Snow depths of 20 to 24 inches in the State were reported with a water equivalent of about 4 inches.

Ice in the Connecticut River at Hartford, Conn., which was 10 inches thick, broke up and floated out as the result of light to moderate rains from December 29 to 30. Most of the rain froze as it fell and caused only a minor rise in stage in the main river.

Somewhat similar conditions prevailed over the Hudson River basin. A rapid rise took place in the river at Albany, N. Y., during the night of December 30–31, exceeding flood stage by 1.2 foot. The rise was due largely to the formation of ice gorges in the Mohawk River and their release. The average precipitation over the Mohawk Basin was 4 inches during December 27–31, but was mainly in the form of freezing rain.

Minor flooding occurred in the Delaware River basin as the result of practically continuous rains from December 27–30. Flood stages were exceeded in the Lehigh and Schuylkill Rivers and in the Delaware River at Easton, Pa. The moderately light snow-cover present over the basin was depleted by the rains which averaged about 3 inches over the basin.

Rains averaged from 3.5 to 5 inches over the Susquehanna River basin during the last 4 days of December. These rains falling on a light to moderate snow-cover, resulted in moderately severe flooding in much of the basin. The stage reached at Binghamton, N. Y., was the highest since the record flood of March 1936. In most of the remainder of the basin, the crest stages during this flood period were the highest since April 1940, and the second highest since March 1936.

A moderate rise occurred in the Potomac River during the last few days of the month. Flood stage was reached or exceeded slightly at Cumberland, Md., Harpers Ferry, W. Va., and at Washington (near), D. C. The Shenandoah River reached only moderate stages. A light to moderate snow-cover in the upper Potomac resulted in high run-off rates, especially above Cumberland from the moderate rains which occurred. For the period December 27–30, the rainfall average 1.85 inches over the entire basin, of which 1.25 inches occurred during a 24-hour period of the 29–30th.

Stages in the James River basin remained at low stages until the 29th, when moderately heavy rains caused a rapid rise. Flood stages in the main river were exceeded at a few points. At Richmond, Va., a stage of 10.6 feet was reached on the 31st.

The Roanoke, Saluda, and Broad Rivers in South Carolina, and the Savannah, Ocmulgee, and Oconee Rivers in Georgia experienced rises late in the month, reaching, or exceeding, flood stage slightly at a few points.

East Gulf of Mexico drainage.—A general rain from December 27–29 extended over the entire drainage. The heaviest precipitation was centered over Alabama. In the Cahaba River watershed, where the maximum rainfall occurred, the average precipitation above Centerville, Ala., on December 27–28, was 8.5 inches, and above Marion Junction, Ala., 7.2 inches, with a maximum amount reported of 10.05 inches. Other basins in the Alabama River system had averages as follows: Etowah basin, 3.6 inches; Oostanaula basin, 4.7 inches; and Tallapoosa basin, 3.4 inches. In the Coosa basin between Rome, Ga., and Gadsden, Ala., the rain averaged 6.4 inches, while the average over the basin above Gadsden was 4.9 inches.

Amounts were also heavy in the Black Warrior-Tombigbee watershed, the average for the entire basin being estimated at 5 inches. Maximum amounts in this basin were 10.15 inches at Lock No. 2 in the lower Tombigbee, and 9.4 and 8.6 inches, respectively, at Birmingham and Oneonta, Ala., in the upper Black Warrior watershed.

Considerable flooding occurred in the Cahaba basin. The crest stage reached at Centerville was 34.8 feet, compared to a stage of 36.6 feet in the flood of April 8, 1938, and 35.3 feet in February 1936. In the Alabama River, the crest at Montgomery was 41.1 feet, compared to 57.1 feet in 1919, and at Millers Ferry, Ala., 47.4 feet, compared to 51.8 feet in 1933.

The flood in the Black Warrior and Tombigbee Rivers generally was not severe. At Tuscaloosa, Ala., the Black Warrior crested at 60.5 feet, 8 feet under the record stage in 1900. The Tombigbee River did not reach flood stage in the reaches above its junction with the Black Warrior, and below the crests were generally more than 10 feet lower than the record stages.

Light to moderate floods in the Pearl and Pascagoula Rivers caused no damage of consequence.

Mississippi System.—Heavy rains on December 26–27, extending from eastern Iowa southward and south-southwestward into Missouri, Arkansas, eastern Kansas, and eastern Oklahoma, resulted in extensive flooding in those areas. The floods were not unusually severe, but in some cases were the highest of record for December principally in the Gasconade, Meramec, and Osage Rivers in Missouri and in the White River basin in southern Missouri and northern Arkansas.

Ohio River basin.—Moderately heavy rains in the upper Ohio basin, combined with melting snow to produce the highest December flood of record and the third highest in the past 100 years at Pittsburgh, Pa. The Scioto, the Wabash, tributaries in West Virginia and Kentucky, the Cumberland and the Tennessee were also in flood. Heavy rains were confined largely to the extreme southern portion of the Ohio basin, while over

the remainder of the basin moderately heavy rains and melting snows caused the flooding.

In the upper Ohio River, the crest stages were lower than the March 1936 stages, whereas in the middle and lower reaches the crests in this flood closely approached or exceeded the 1936 crests, but were well under the January 1937 crests.

As the flooding continued at the close of the month, a further report will be made in a later issue of the REVIEW.

Pacific Slope drainage.—Excessive flooding, accompanied by considerable damage, occurred in the Willamette River basin at the close of the month. A report on this flood will be made in a later issue of the REVIEW.

FLOOD-STAGE REPORT FOR DECEMBER 1942

[All dates in December unless otherwise specified]

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ST. LAWRENCE DRAINAGE					
Lake Michigan					
Red Cedar:	*Feet*			*Feet*	
Williamston, Mich.	7	28	28	[1] 8.0	28
East Lansing, Mich.	8	28	30	9.3	29
Lake Huron					
Shiawassee: Owosso, Mich.	7	28	29	7.4	28
Lake Erie					
St. Marys: Decatur, Ind.	13	28	28	13.4	28
St. Joseph:					
Montpelier, Ohio	10	28	31	13.3	29
Fort Wayne, Ind.	12	28	(2)	13.6	31
Maumee: Fort Wayne, Ind.	15	28	30	16.9	28–29
ATLANTIC SLOPE DRAINAGE					
Hudson: Albany, N. Y.	11	31	31	12.2	31
Schuylkill:					
Reading, Pa.	13	30	30	13.1	30
Philadelphia, Pa.	10.5	30	30	11.4	30
Lehigh: Lehighton, Pa.	7	30	(1)	9.4	30
Delaware: Easton, Pa.	22	31	31	22.5	31
Tioughnioga: Whitney Point, N. Y.	12	30	(1)	16.6	31
Chenango:					
Sherburne, N. Y.	8	30	31	10.0	30
Greene, N. Y.	8	29	(2)	14.3	31
Binghamton, N. Y.	16	30	Jan. 2	24.0	31
Chemung:					
Corning, N. Y.	16	30	31	17.65	30
Elmira, N. Y.	12	30	31	17.4	31
Chemung, N. Y.	12	30	Jan. 1	19.0	31
West Branch:					
Clearfield, Pa.	10	30	31	11.15	30
Renovo, Pa.	16	30	31	17.8	30
Williamsport, Pa.	20	30	Jan. 1	23.0	31
Little Juniata: Spruce Creek, Pa.	7	29	30	10.5	30–
Juniata:					
Huntingdon, Pa.	12	30	30	12.1	30
Mapleton Depot, Pa.	20	30	31	20.9	31
Susquehanna:					
Oneonta, N. Y.	12	29	31	[1] 18.15	31
Bainbridge, N. Y.	12	30	Jan. 1	20.7	31
Binghamton, N. Y.	14	30	Jan. 2	20.0	31
Vestal, N. Y.	14	29	Jan. 2	27.4	31
Towanda, Pa.	16	30	Jan. 2	23.3	31
Wilkes Barre, Pa.	22	30	Jan. 2	29.6	Jan. 1
Danville, Pa.	20	31	Jan. 2	24.0	Jan. 1
Sunbury, Pa.	16	31	Jan. 2	19.25	Jan. 1
Harrisburg, Pa.	17	31	Jan. 2	19.4	Jan. 1
North Branch of Potomac: Cumberland, Md.	17	30	30	17.1	30
Potomac:					
Harpers Ferry, W. Va.	18	31	31	18.0	31
Washington (near), D. C.	10	31	Jan. 1	13.1	31–Jan. 1
James:					
Bremo Bluff, Va.	19	30	Jan. 1	21.9	30–31
Columbia, Va.	10	29	(1)	24.0	31
State Farm, Va.	12	30	(2)	15.1	31
Richmond, Va.	8	31	Jan. 2	10.6	31–Jan. 1
Roanoke:					
Randolph, Va.	21	31	31	23.0	31
Weldon, N. C.	31	31	(2)	------	------
Saluda: Pelzer, S. C.	6	29	Jan. 1	10.0	31
Broad: Blairs, S. C.	14	30	31	17.5	31
Savannah: Butler Creek, Ga.	21	30	(1)	------	------
Ocmulgee: Macon, Ga.	18	29	29	18.0	29
Oconee: Milledgeville, Ga.	20	29	31	22.5	30

See footnotes at end of table.

FLOOD-STAGE REPORT FOR DECEMBER 1942—Continued

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
EAST GULF OF MEXICO DRAINAGE					
Oostanaula:	*Feet*			*Feet*	
Resaca, Ga.	22	29	Jan. 3	30.0	31
Rome, Ga.	25	29	Jan. 3	29.9	31
Etowah:					
Canton, Ga.	17	30	31	19.0	30
Cartersville, Ga.	18	29	31	24.8	30
Coosa:					
Mayos Bar, Ga.	28	30	(2)	[1] 33.6	31
Gadsden, Ala.	20	28	(2)	26.9	30
Lock No. 4, Lincoln, Ala.	17	29	Jan. 4	25.3	29
Childersburg, Ala.	20	29	Jan. 1	26.35	30
Wetumpka, Ala.	45	------	------	44.4	31
Cahaba:					
Centerville, Ala.	23	28	31	[1] 34.75	28
Marion Junction, Ala.	36	30	Jan. 2	41.5	30
Alabama:					
Montgomery, Ala.	35	30	Jan. 3	41.1	Jan. 1
Selma, Ala.	45	------	------	44.6	Jan. 2
Millers Ferry, Ala.	40	31	(2)	[1] 47.4	Jan. 4
Black Warrior:					
Lock No. 10, Tuscaloosa, Ala.	47	28	Jan. 2	60.5	30
Lock No. 7	35	29	Jan. 7	50.9	Jan. 2
Tombigbee:					
Lock No. 4, Demopolis, Ala.	39	29	Jan. 8	49.8	Jan. 4
Lock No. 3	33	28	Jan. 10	51.3	Jan. 5
Lock No. 2	46	29	Jan. 9	52.4	Jan. 5
Lock No. 1	31	29	Jan. 12	35.8	Jan. 9
Chickasawhay: Shubuta, Miss.	30	29	29	30.7	29
Pascagoula: Merrill, Miss.	22	31	Jan. 4	23.0	Jan. 2
Bogue Chitto: Franklinton, La.	11	29	31	16.1	30
Pearl:					
Jackson, Miss.	18	28	Jan. 4	22.5	28
Monticello, Miss.	15	28	Jan. 1	20.2	29
Columbia, Miss.	17	29	Jan. 2	19.0	31
Pearl River, La.	12	30	(2)	15.6	Jan. 2
MISSISSIPPI SYSTEM					
Upper Mississippi Basin					
Rock: Moline, Ill.	10	27	Jan. 6	13.0	29
Skunk: Augusta, Iowa	15	27	28	15.7	27
Des Moines: Eddyville, Iowa	15	29	29	15.6	29
Salt: New London, Mo.	19	27	30	24.3	29
Illinois:					
Morris, Ill.	13	28	(2)	18.0	28
Peru, Ill.	17	28	(2)	21.1	29
Havana, Ill.	14	31	(2)	------	------
Beardstown, Ill.	14	29	(2)	------	------
Bourbeuse: Union, Mo.	12	28	31	19.0	29
Meramec:					
Sullivan, Mo.	11	27	30	25.1	28
Pacific, Mo.	11	27	(2)	24.6	30
Valley Park, Mo.	14	27	(2)	28.7	30
Mississippi:					
Hannibal, Mo.	13	28	28	13.0	28
Louisiana, Mo.	12	19	31	13.0	29
Grafton, Ill.	18	30	(2)	18.9	31
Chester, Ill.	27	30	(2)	------	------
Missouri Basin					
Grand:					
Chillicothe, Mo.	18	27	30	27.9	28
Brunswick, Mo.	12	29	(2)	13.7	31
Osage:					
Quenemo, Kans.	30	28	28	31.0	28
La Cygne, Kans.	25	29	29	27.0	29
Osceola, Mo.	20	28	(2)	25.0	30
St. Thomas, Mo.	23	28	(2)	27.2	30–31
Gasconade: Jerome, Mo.	15	27	31	25.4	28
Missouri:					
Hermann, Mo.	21	28	(2)	24.0	30–31
St. Charles, Mo.	25	28	(2)	29.0	31
Ohio Basin					
Allegheny:					
Olean, N. Y.	10	30	Jan. 1	13.5	31
Warren, Pa.	12	30	31	13.0	31
Franklin, Pa.	17	30	31	18.25	30
Parkers Landing, Pa.	20	30	31	21.8	30
Lock No. 8, Mosgrove, Pa.	24	29	Jan. 2	32.9	30
Lock No. 5, Schenley, Pa.	24	29	Jan. 2	37.3	30
Lock No. 4, Natrona, Pa.	24	29	Jan. 2	34.3	30
Lock No. 3, Acmetonia, Pa.	25	29	Jan. 1	35.5	30
West Fork: Clarksburg, W. Va.	5	29	30	5.4	30
Youghiogheny: Confluence, Pa.	12	30	30	12.2	30
Monongahela:					
Lock No. 7, Greensboro, Pa.	30	30	31	31.4	30
Lock No. 4, Charlerol, Pa.	30	30	31	33.4	30
McKeesport, Pa.	20	30	31	20.1	30
Muskingum:					
Lock No. 7, McConnelsville, Ohio	22	31	31	22.1	31
Lock No. 3, Lowell, Ohio	25	31	31	26.7	31
Little Kanawha: Creston, W. Va.	20	30	(2)	23.75	30
Hocking: Athens, Ohio	17	31	(2)	18.1	31
Kanawha: Red House, W. Va.	46	31	31	46.0	31

FLOOD-STAGE REPORT FOR DECEMBER 1942—Continued

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
MISSISSIPPI SYSTEM—continued					
Ohio Basin—Continued					
	Feet			*Feet*	
Twelvepole Creek: Wayne, W. Va	25	30	30	26.2	30
Scioto:					
Circleville, Ohio	14	29	Jan. 1	17.1	31
Chillicothe, Ohio	16	30	Jan. 2	18.3	Jan. 1
Licking: Falmouth, Ky	28	30	31	28.5	31
North Fork: Jackson, Ky	28	30	31	30.6	31
Kentucky:					
Lock No. 7, Highbridge, Ky	30	30	31	33.6	30
Lock No. 4, Frankfort, Ky	31	30	Jan. 2	33.7	31
Barren: Bowling Green, Ky	28	30	(1)	----	----
Green:					
Munfordville, Ky	28	29	(1)	----	----
Lock No. 6, Brownsville, Ky	28	30	(1)	----	----
Lock No. 4, Woodbury, Ky	33	29	(1)	----	----
West Fork of White:					
Anderson, Ind	10	27	28	10.3	27
Edwardsport, Ind	12	29	Jan. 2	14.6	Jan. 1
Wabash:					
Wabash, Ind	12	27	30	16.2	28
La Fayette, Ind	11	27	Jan. 2	17.2	30
Covington, Ind	16	28	Jan. 3	20.2	31
Terre Haute, Ind	14	30	Jan. 5	15.9	Jan. 3
South Fork: New River, Tenn	18	29	30	22.3	29
Cumberland:					
Williamsburg, Ky	19	29	Jan. 2	25.0	31
Burnside, Ky	50	30	31	60.6	30
Celina, Tenn	28	29	Jan. 6	52.0	Jan. 2
Carthage, Tenn	40	30	Jan. 6	50.0	Jan. 1
Nashville, Tenn	40	31	Jan. 9	45.9	Jan. 6
Clarksville, Tenn	46	Jan. 3	Jan. 10	49.4	Jan. 8
Eddyville, Ky	50	Jan. 1	(2)	59.0	Jan. 11
French Broad:					
Asheville, N. C	9	30	30	9.0	30
Marshall, N. C	10	29	29	10.0	29
Little Tennessee: McGhee, Tenn	18	29	30	24.2	30
Hiwassee: Charleston, Tenn	22	30	30	22.1	30
Tennessee:					
Chattanooga, Tenn	30	29	Jan. 1	35.8	30
Bridgeport, Ala	21	30	31	24.3	31
Florence, Ala	18	29	(1)	----	----

FLOOD-STAGE REPORT FOR DECEMBER 1942—Continued

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
MISSISSIPPI SYSTEM—continued					
Ohio Basin—Continued					
Ohio:	*Feet*			*Feet*	
Pittsburgh, Pa	25	29	Jan. 1	36.6	31
Coraopolis, Pa	26	30	Jan. 1	35.8	31
Dam No. 7, Midland, Pa	30	29	Jan. 2	49.2	31
Dam No. 12, Wheeling, W. Va	35	30	Jan. 2	51.5	31
Marietta, Ohio	35	30	(2)	----	----
White Basin					
Buffalo: Gilbert, Ark	30	27	27	30.5	27
Current: Doniphan, Mo	10	28	31	21.2	29
Black:					
Leeper, Mo	11	28	28	13.8	28
Poplar Bluff, Mo	16	28	31	19.6	29
Black Rock, Ark	14	27	(2)	23.6	29
Little Red: Heber Springs, Ark	30	28	28	32.1	28
White:					
Cotter, Ark	21	27	31	27.6	30
Calico Rock, Ark	19	27	Jan. 1	38.6	28
Batesville, Ark	23	27	Jan. 2	37.6	29
Newport, Ark	20	29	Jan. 5	31.8	Jan. 1
Georgetown, Ark	21	30	Jan. 5	28.0	Jan. 5
Arkansas Basin					
Neosho:					
Burlington, Kans	23	29	29	23.0	29
Oswego, Kans	17	28	29	17.6	29
Poteau: Poteau, Okla	21	27	Jan. 1	29.0	29
Petit Jean: Danville, Ark	20	28	30	22.1	29
Arkansas:					
Fort Smith, Ark	22	28	Jan. 1	24.3	30
Van Buren, Ark	22	28	Jan. 1	23.4	30
Red Basin					
Sulphur: Hagansport, Tex	36	22	23	36.0	22–23
		27	30	38.9	28
Lower Mississippi Basin					
St. Francis: Fisk, Mo	20	29	(2)	----	----
WEST GULF OF MEXICO DRAINAGE					
East Fork of Trinity: Rockwall, Tex	10	28	29	10.8	29

[1] Estimated. [2] Continued into following month.

OPENING AND CLOSING DATES OF RIVER-NAVIGATION IN THE UNITED STATES

By BENNETT SWENSON

[Weather Bureau, Washington, February 1943]

In the earliest settlements, streams were used as avenues of communication and transportation and in the winter the ice was used as a bridge for all kinds of traffic. As a consequence, the opening and closing of the river to navigation was watched closely and records were kept by public-spirited men voluntarily dating back at least to 1789. Beginning in 1871, records were kept by the Signal Corps of the United States Army, and later by the Weather Bureau.

Certain streams have been canalized in order to maintain navigation even during periods when the river stages ordinarily would be too low for boat traffic. However, in the colder parts of the country, river-navigation is suspended when the river becomes obstructed by a solid sheet of ice, or when floating ice becomes heavy enough to present a hazard, and it is not resumed until the river is again free of ice.

In the table below is given a summary of the closing and opening dates of river-navigation, based on the aforementioned records. These records represent in some cases the actual freezing and breaking of the ice in the rivers, and in other cases, the actual date of the first and last boat that traversed the stream. However, the two are closely related and no distinction is made in the summary.

Shipman [1] has shown that at Davenport, Iowa, the 3-day average temperature, on and before the closing date, is 13.1° and likewise the 3-day average temperature, on and before the opening date, is 39.7°. He has also plotted the average temperature at Davenport, December to March, against the length of the closed season. These points follow rather closely a line starting at 39.7° (the temperature at which the river opens), running through 27.5° (the normal temperature for the 4 months) at the point of average length of the closed season, and then extending down to 13.1° (the temperature at which the river closes) at the maximum length of closed season observed. This shows that temperature is the main factor in the length of the closed season. Shipman points out that other factors such as the river-stage and fluctuations of the stage have a small influence.

As shown in the accompanying table, the average length of the closed season varies from 127 days at Bismarck, N. Dak., to 49 days at Columbus, Ohio. The longest closed season of record occurred at Omaha, Nebr., with a total of 157 days in 1874–75. Several of the places show open seasons during one or more winters. At Bismarck, the shortest season of record is 90 days and the longest 151 days.

Trenton, N. J., at the head of navigation in the Delaware River, which is not shown in the table, is closed for at least a few days almost every year. Definite dates are not available for all years; however, for certain unusually cold seasons, navigation was suspended as follows:

Dec. 29, 1917, to Feb. 14, 1918.
Jan. 3, 1920, to Mar. 10, 1920.
Jan. 28, 1934, to Mar. 7, 1934.
Jan. 20, 1936, to Mar. 9, 1936.
Dec. 28, 1939, to Feb. 15, 1940.

[1] Shipman, T. G., Ice Conditions on the Mississippi River at Davenport, Iowa: Am. Geophys. Union Trans., 1938, pp. 590-594.

Summary of closing and opening dates of river navigation in the United States

Station	River	Years of record	Closing date			Opening date			Period of suspended navigation				
			Average	Earliest	Latest	Average	Earliest	Latest	Average, days	Maximum		Minimum	
										Days	Season	Days	Season
Albany, N. Y.	Hudson	[1] 1789–1942	Dec. 19	Nov. 13, 1819	Feb. 10, 1934	Mar. 20	Feb. 4, 1842	Apr. 14, 1873 Apr. 14, 1920	91	136	1842–43	0	1931–33, 1934–35, 1936–37.
Hartford, Conn.	Connecticut	[2] 1857–1930	Dec. 23	Nov. 22, 1880	Feb. 14, 1923	Mar. 10	Jan. 23, 1880	Apr. 27, 1920	77	122	1871–72 1919–20	0	1920–21, 1923–26.
Columbus, Ohio	Scioto	1898–1912 1917–1930	Dec. 26	Nov. 28, 1903	Feb. 6, 1924	Feb. 13	Dec. 29, 1910	Mar. 11, 1901	49	87	1903–4	4	1908–9.
Peoria, Ill.	Illinois	1834–1851 1856–1930	Dec. 16	Nov. 13, 1842	Feb. 7, 1914	Feb. 23	Jan. 1, 1836 Jan. 1, 1845 Jan. 1, 1848	Mar. 30, 1901 Mar. 30, 1912	69	126	1842–43	0	1877–78, 1889–90.
St. Paul, Minn.	Mississippi	1866–1869 1872–1942	Dec. 7	Nov. 12, 1893 Nov. 12, 1911	Jan. 30, 1932	Mar. 19	Feb. 2, 1931	Apr. 14, 1872	102	142	1875–76	45	1931–32.
LaCrosse, Wis.	do	1874–1942	Dec. 11	Nov. 19, 1880	Jan. 19, 1932	Mar. 21	Feb. 3, 1931	Apr. 12, 1899	100	138	1880–81	62	1881–82.
Dubuque, Iowa	do	1874–1942	Dec. 4	Nov. 13, 1896	Jan. 15, 1905	Mar. 20	Feb. 17, 1921	Apr. 12, 1881	106	147	1880–81	61	1920–21.
Davenport, Iowa	do	1841–1942	Dec. 25	Nov. 7, 1842	Feb. 4, 1845 Feb. 4, 1890	Mar. 3	Jan. 7, 1880	Apr. 10, 1843	68	154	1842–43	0	1857–58, 1862–63, 1877–78, 1881–82, 1905–7, 1931–32.
Keokuk, Iowa	do	1871–1942	Dec. 11	Nov. 17, 1891	Jan. 15, 1874	Mar. 6	Jan. 19, 1874	Mar. 29, 1881	85	121	1874–75	4	1873–74.
Hannibal, Mo.	do	1892–1931	Dec. 25	Nov. 25, 1911	Jan. 31, 1897	Feb. 21	Jan. 19, 1910	Mar. 18, 1912	58	114	1911–12	0	1913–14.
Bismarck, N. Dak.	Missouri	1880–1942	Nov. 25	Oct. 27, 1919	Dec. 27, 1939	Apr. 1	Mar. 13, 1910	Apr. 16, 1940	127	151	1882–83 1919–20	90	1925–26.
Sioux City, Iowa	do	1889–1942	Dec. 19	Nov. 12, 1896 Nov. 12, 1919	Feb. 8, 1939	Mar. 6	Feb. 5, 1928	Apr. 4, 1899	77	128	1896–97	0	1930–32, 1939–40.
Omaha, Nebr.	do	1874–1889 1894–1942	Dec. 22	Oct. 23, 1874	Feb. 24, 1901	Mar. 4	Jan. 12, 1921	Mar. 31, 1876	72	157	1874–75	0	1940–41.
Kansas City, Mo.	do	1874–1942	Dec. 20	Nov. 14, 1875	Feb. 1, 1908	Feb. 24	Jan. 8, 1880	Mar. 27, 1912	66	124	1875–76	0	1890–92, 1933–35, 1936–37.

[1] Closing dates available beginning in 1789, opening dates in 1813 and from 1817 to 1942.
[2] Opening dates available since 1838.

CLIMATOLOGICAL DATA

CONDENSED CLIMATOLOGICAL SUMMARY OF TEMPERATURE AND PRECIPITATION BY SECTIONS

[For description of tables and charts, see REVIEW, January 1940, p. 32]

In the following table are given, for the various sections of the climatological service of the Weather Bureau, the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

Section	Temperature								Precipitation					
			Monthly extremes								Greatest monthly		Least monthly	
	Section average	Departure from the normal	Station	Highest	Date	Station	Lowest	Date	Section average	Departure from the normal	Station	Amount	Station	Amount
	°F.	°F.		°F.			°F.		In.	In.		In.		In.
Alabama	49.5	+1.8	Fairhope	82	25	Scottsboro	15	14	8.12	+2.71	Ashville	15.42	Tibbie	3.68
Arizona	45.8	+3.0	7 stations	82	[1] 2	Alpine	−2	27	1.08	−.21	Pinal Ranch	4.87	Pacinimo	.00
Arkansas	42.7	−.2	Crossett	80	25	Corning	16	14	4.87	+.65	Danville	8.86	Waldron	2.62
California	46.6	+.8	Santa Ana	88	15	Boca	1	[1] 25	3.64	−.27	Elk Valley	30.85	5 stations	.00
Colorado	28.8	+3.0	2 stations	74	17	Taylor Park	−31	27	.88	−.02	Cumbres	6.05	4 stations	T
Florida	62.4	+2.5	do	91	[1] 5	2 stations	23	17	3.45	+.63	Tavernier	7.71	Trafford Lake	.42
Georgia	48.1	+.3	Camp Stewart	86	26	Blairsville	7	14	6.29	+1.97	Summerville	13.79	Savannah Beach	2.53
Idaho	28.3	+1.8	Three Creek	65	16	Sun Valley	−28	26	3.35	+1.26	Sheep Hill	12.12	St. Anthony	.39
Illinois	27.2	−4.0	7 stations	74	26	5 stations	−9	[1] 3	2.77	+.64	Moline Airport	4.81	West Frankfort	1.33
Indiana	28.1	−4.2	Tell City	74	26	Scottsburg	−14	21	2.48	−.29	Vevay	5.32	Lafayette	1.01
Iowa	20.3	−3.9	2 stations	53	23	2 stations	−20	13	1.59	+.40	Mount Pleasant	4.93	Inwood	.29
Kansas	32.4	−.8	Sedan	73	17	Burr Oak	−11	6	1.82	+.96	Columbus	4.16	St. Francis	.34
Kentucky	36.3	−1.6	2 stations	76	26	Maysville	−5	21	5.34	+1.38	Stearns	9.18	Murray	2.73
Louisiana	53.4	+.8	Bogalusa	86	24	Robeline	20	17	5.16	−.18	Bastrop	9.26	Gueydan (near)	2.05
Maryland-Delaware	32.3	−3.1	Pocomoke City, Md.	67	29	Oakland, Md	−25	21	3.78	+.60	Oakland, Md	5.62	Laurel, Md	2.55
Michigan	22.1	−3.6	South Haven	53	27	3 stations	−25	20	3.06	+.90	Painesdale	6.57	Adrian	1.27
Minnesota	11.3	−4.5	Madison	46	16	Warroad	−33	19	.93	+.16	Pigeon River Bridge	2.12	Tracy	.17
Mississippi	49.1	+.7	2 stations	82	25	Louisville	20	17	7.12	+1.79	Dlo	11.26	Biloxi	3.56
Missouri	32.7	−1.6	do	76	[1] 26	Memphis	−4	[1] 8	4.01	+1.82	Salem	8.50	2 stations	1.72
Montana	25.3	+1.8	do	68	16	Dunkirk (near)	−29	5	.92	−.04	Heron	4.54	Adel (near)	.00
Nebraska	28.1	+.9	Bankelman	69	29	Gordon	−14	2	.65	−.04	Auburn	2.87	Merriman	.00
Nevada	36.9	+5.5	Las Vegas	82	24	Mala Vista Ranch	−9	25	.94	−.06	Lewers Ranch	5.73	9 stations	.00
New England	22.1	−4.4	6 stations	59	2	Lake Frontiere, Maine.	−35	[1] 19	4.74	+1.38	Putnam, Conn	7.71	Newport, Vt	1.52
New Jersey	30.0	−3.8	Burlington	67	30	Layton	−17	21	4.53	+.98	Dover	6.76	Berlin	2.87
New Mexico	38.4	+4.1	Hagerman	83	2	Selsor Ranch	−16	7	1.22	+.51	Sandia Park	4.55	2 stations	T
New York	22.8	−4.1	Mineola	60	2	Stillwater Reservoir.	−46	20	5.43	+2.46	Boonville	9.30	Peru	2.71
North Carolina	40.9	−1.7	2 stations	79	[1] 29	Mount Mitchell	−4	2	5.36	+1.53	Rock House	15.63	Manteo	1.30
North Dakota	10.9	−2.4	New England	53	28	2 stations	−30	12	.53	+.05	Fullerton	1.30	Mott	.12
Ohio	27.8	−4.0	Portsmouth	68	27	McArthur	−17	21	3.75	+1.05	Gallipolis (near)	5.92	Bowling Green	1.53
Oklahoma	40.9	+.8	Frederick	77	17	2 stations	7	7	2.63	+.96	Bear Mtn. Tower	6.54	Goodwell	.51
Oregon	36.3	+2.6	Pilot Rock	69	16	Olive Lake	−15	25	7.07	+3.14	Illahe	35.09	Plush	.58
Pennsylvania	27.4	−4.0	3 stations	61	29	Somerset	−25	21	5.06	+1.94	Pikes Creek	6.75	Erie	2.08
South Carolina	45.8	−1.1	Blackville	84	28	Caesars Head	11	14	4.29	+.69	Caesars Head	12.98	Summerville	2.29
South Dakota	21.3	−.7	Ardmore	60	16	Ralph	−24	2	.32	−.21	Dumont	1.45	Faulkton	T
Tennessee	40.0	−.8	Johnsonville	79	26	Celina	−1	4	7.64	+3.11	Monteagle	14.62	Samburg	2.79
Texas	50.9	+2.0	Laredo	95	3	Dalhart	5	8	2.04	−.24	Linda[illegible] (near)	6.85	2 stations	.00
Utah	31.2	+4.1	Springdale	69	[1] 16	Soldier Summit	−15	15	1.10	−.01	Silver Lake	5.77	5 stations	.00
Virginia	36.5	−1.6	2 stations	77	29	Timberville	−13	21	4.04	+.97	Pennington Gap	7.06	Hot Springs	1.91
Washington	34.4	+.9	Pomeroy	66	16	Stockdill Ranch	−6	[1] 7	5.91	+.46	Wind River	24.68	Benton City	.89
West Virginia	31.6	−3.2	Coalwood	75	26	2 stations	−21	21	5.42	+2.12	Branchland	8.00	Petersburg	1.70
Wisconsin	16.5	−4.2	4 stations	40	[1] 22	do	−25	[1] 20	1.90	+.58	Sheboygan	4.03	Mellen	.29
Wyoming	25.8	+3.6	3 stations	63	20	Moran	−30	27	.65	−.09	Moose	5.25	Saratoga	T
Alaska (November)	9.7	−4.3	View Cove	61	2	Allukaket	−50	20	2.04	−.69	Ketchikan	22.58	Matanuska No. 14	.10
Hawaii	73.1	+2.5	2 stations	89	[1] 17	Cule Sanatorium	51	[1] 10	11.00	+1.91	Narsh, Oahu	41.60	Hualalai	.20
Puerto Rico	75.8	+1.4	Ponce	96	5	3 stations	54	[1] 30	3.57	−1.02	La Mina (El Yunque)	14.32	Potala	.25

[1] Other dates also.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max. + min. ÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer	Mean temperature of the dewpoint	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
	Ft.	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	°F.	°F.	°F.		°F.	°F.		°F.	°F.	°F.	°F.	%	*In.*	*In.*		*Miles*								*0-10*	*In.*	*In.*	
New England				**23.8**	**−4.2**													**75**	**4.82**	**+1.4**										**6.4**			
Eastport	75	67	85	29.83	29.92	−0.06	21.3	−5.0	52	2	28	−13	20	15	39	19	15	72	2.66	−1.1	11	13.2	w.	46	se.	2	11	6	14	5.7	9.9	2.7	0
Greenville Maine	1,070	6	41	28.72	29.94	.....	13.6	−5.0	44	2	22	−25	20	5	31	13	10	...	4.88	+1.8	15	.....	nw.	...	.....	...	6	7	18	.....	15.8	10.0	0
Portland, Maine [1]	103	5	36	29.84	29.96	−.07	23.0	.....	52	2	32	−15	20	14	38	20	14	72	4.99	+1.0	9	9.9	sw.	47	se.	2	9	10	12	5.6	6.3	T	0
Concord [2]	289	4	45	29.66	29.99	−.07	21.4	−5.4	53	2	30	−16	20	12	44	19	13	73	4.72	+1.6	12	8.1	nw.	33	w.	2	7	7	17	6.7	6.2	3.0	0
Burlington [2]	403	11	48	29.52	29.98	−.07	19.1	−5.3	41	11	26	−23	20	12	28	18	15	81	2.99	+1.1	14	10.4	s.	35	s.	22	2	7	22	8.3	9.8	3.6	0
Northfield	876	12	60	29.00	29.99	−.06	17.5	−2.9	42	11	26	−27	20	9	44	...	...	...	3.43	+.9	14	7.5	sw.	30	sw.	2	4	4	23	7.7	14.9	12.0	0
Boston [1]	124	33	62	29.85	29.99	−.06	28.6	.....	59	2	35	−11	20	22	33	25	19	66	4.72	+1.3	11	13.5	w.	47	se.	2	8	9	14	6.3	6.8	.0	1
Nantucket	12	10	63	29.98	29.99	−.06	32.3	−3.5	56	2	39	−3	20	26	35	29	25	78	4.56	+.8	15	13.3	nw.	38	sw.	2	10	5	16	6.5	13.0	.0	1
Block Island	26	11	46	29.98	30.01	−.05	31.7	−4.3	58	2	38	−4	20	25	32	29	24	74	5.36	+1.6	12	21.2	w.	57	w.	2	13	4	14	5.4	10.8	.0	0
Providence [2]	159	46	60	29.84	30.02	−.04	28.7	−2.9	56	2	36	−10	20	22	34	25	19	73	6.39	+3.0	11	10.3	sw.	49	se.	2	11	3	17	6.3	9.1	.0	1
Hartford [1]	159	5	44	29.85	30.03	−.04	26.2	.....	58	2	34	−10	20	18	39	23	19	77	6.69	+2.7	12	9.6	n.	37	sw.	2	9	7	15	6.1	10.2	T	0
New Haven [2]	107	74	153	29.92	30.04	−.03	28.6	−3.9	57	2	35	−7	20	22	37	26	23	81	6.49	+2.5	14	9.8	n.	34	w.	2	12	5	14	5.8	12.8	.0	2
Middle Atlantic States							**32.9**	**−2.6**										**74**	**4.42**	**+1.2**									**6.8**			
Albany [1]	97	26	40	29.92	30.02	−.06	22.6	−2.9	42	25	30	−18	21	16	30	20	16	74	4.24	+1.6	13	10.1	w.	38	w.	31	6	5	20	7.0	7.3	.6	0
Binghamton	871	57	79	29.06	30.04	−.05	24.8	−3.4	45	1	32	−17	20	18	35	22	19	85	6.09	+3.8	14	7.3	w.	38	n.	13	2	10	19	8.0	11.3	1.0	0
New York	314	415	454	29.70	30.05	−.04	31.6	−3.4	56	2	39	−3	20	25	39	27	20	64	4.31	+.7	15	17.3	w.	58	w.	2	7	9	15	6.2	7.4	.0	2
Harrisburg [1]	374	30	49	.....	30.09	−.03	30.5	−2.2	48	24	37	2	21	24	...	27	21	72	5.04	+2.0	16	8.5	w.	30	w.	2	7	9	15	.....	7.8	.0	0
Philadelphia [2]	114	174	367	29.95	30.08	−.03	32.7	−3.6	57	2	39	2	20	26	39	28	23	76	4.22	+.8	15	13.2	nw.	39	sw.	2	5	12	14	6.7	5.2	.0	1
Reading	323	47	306	29.71	30.08	.....	30.6	−3.6	53	2	37	0	21	24	37	...	...	...	5.09	+1.5	15	12.2	nw.	47	w.	2	7	7	17	6.8	6.6	.0	0
Scranton	865	72	104	29.15	30.05	−.05	26.6	−4.1	49	2	33	−10	20	20	35	...	...	...	4.73	+1.7	12	7.6	sw.	26	nw.	31	2	13	16	7.3	8.3	.0	0
Atlantic City	52	37	172	30.01	30.07	−.03	35.2	−1.2	58	2	42	1	21	28	36	31	25	70	3.86	−.1	13	16.9	w.	45	w.	2	7	10	14	6.5	3.0	.0	3
Trenton	190	89	107	29.85	30.07	.....	30.7	−3.7	58	2	38	−2	21	24	40	28	22	70	4.27	+.9	15	9.8	nw.	33	w.	2	5	12	14	6.6	7.1	.0	2
Baltimore [2]	123	100	215	29.96	30.09	−.04	34.9	−2.3	51	30	41	5	21	29	39	30	25	72	3.96	+.6	15	10.9	sw.	44	sw.	2	7	6	18	6.9	5.1	.0	0
Washington [1]	112	56	100	29.37	30.11	−.02	34.8	−1.8	50	1	42	4	21	28	27	31	25	71	3.83	+.5	16	8.2	w.	37	w.	2	6	7	18	6.9	5.7	.0	0
Cape Henry	18	8	54	30.06	30.08	.....	41.8	−1.9	74	29	48	17	21	35	30	38	34	77	4.60	+1.2	17	14.0	n.	47	nw.	2	8	8	15	6.4	6.0	.0	1
Lynchburg	686	144	184	29.36	30.11	−.03	37.0	−2.5	58	15	45	6	21	29	27	32	27	72	3.93	+.7	16	8.0	w.	37	w.	30	8	8	15	6.5	2.8	.0	0
Norfolk [2]	91	80	125	30.00	30.10	−.03	42.4	−.7	75	29	50	11	21	35	32	37	33	79	5.15	+1.8	15	10.9	w.	40	w.	2	9	6	16	6.5	7.7	.0	1
Richmond [2]	144	11	52	29.93	30.10	−.04	37.7	−2.1	63	29	46	4	21	29	28	33	29	80	3.05	−.2	16	8.5	sw.	35	w.	2	6	7	18	6.8	7.3	.0	1
South Atlantic States							**47.2**	**−0.5**										**80**	**4.03**	**+0.6**									**5.8**			
Asheville	2,253	89	104	27.70	30.12	−.04	38.5	+.7	68	26	48	12	14	29	37	35	31	78	5.43	+2.2	10	9.6	nw.	27	nw.	30	8	6	17	6.7	4.4	.0	1
Charlotte [2]	779	63	86	29.26	30.12	−.04	41.5	−1.5	70	28	50	15	21	33	31	36	32	78	4.42	+.6	14	7.4	ne.	34	w.	1	8	7	16	6.4	.6	.0	1
Greensboro [1]	886	6	56	29.15	30.12	.....	37.7	.....	69	29	48	9	17	28	35	33	30	78	3.44	.....	16	8.9	ne.	34	w.	2	10	6	15	6.0	2.1	.0	1
Hatteras	11	5	50	30.08	30.09	−.04	47.6	−2.5	68	1	56	22	21	40	27	43	41	87	4.87	+.7	16	15.6	n.	45	w.	2	10	9	12	5.6	T	.0	3
Raleigh [1]	376	27	69	29.71	30.12	−.03	41.0	−.5	76	28	50	10	21	32	31	36	32	78	3.81	+.2	15	9.3	ne.	38	w.	2	9	4	18	6.2	5.6	.0	1
Wilmington	72	73	107	30.04	30.12	−.03	47.6	−1.5	73	28	57	15	21	38	38	43	39	79	2.99	+.2	13	9.9	n.	40	w.	2	10	9	12	5.5	.6	.0	2
Charleston [2]	48	11	92	30.06	30.12	−.03	50.4	−1.3	71	28	59	22	21	42	39	44	41	84	2.96	+.2	12	11.3	n.	34	sw.	1	15	5	11	4.9	.0	.0	0
Columbia, S. C. [2]	347	70	91	29.74	30.12	−.04	45.9	−1.3	74	28	55	20	14	37	33	41	38	83	4.14	+1.1	17	8.8	ne.	36	w.	2	7	8	16	6.3	T	.0	2
Greenville, S. C. [1]	1,040	70	78	28.99	30.11	.....	41.6	.....	64	29	50	19	14	33	33	37	33	79	6.01	+1.2	15	9.7	ne.	40	w.	2	12	5	14	5.7	T	.0	1
Augusta [2]	182	62	77	29.92	30.11	−.05	48.0	−.1	77	28	58	23	14	38	38	42	38	75	4.02	+.8	16	6.4	nw.	28	w.	1	9	5	17	6.2	.0	.0	2
Savannah [2]	65	73	152	30.05	30.12	−.03	52.8	+.4	78	6	62	27	21	43	36	47	44	81	3.49	+.6	15	11.0	nw.	39	nw.	1	12	10	9	4.8	.0	.0	0
Jacksonville [2]	43	86	110	30.08	30.12	−.02	58.6	+2.3	82	6	68	30	17	49	30	51	49	85	2.22	−.8	9	7.6	ne.	28	w.	1	13	6	12	4.8	.0	.0	1
Florida Peninsula							**69.6**	**+3.1**										**83**	**2.02**	**+0.2**									**5.7**			
Key West [2]	21	10	64	30.05	30.07	−.01	73.4	+3.1	84	1	78	54	17	69	17	67	64	80	.79	−.9	4	10.2	ne.	27	nw.	16	9	11	11	5.7	.0	.0	0
Miami [2]	25	124	168	30.06	30.09	−.02	71.0	+3.0	83	12	77	42	17	65	28	63	62	85	2.37	+.7	10	10.0	n.	27	se.	29	6	13	12	6.0	.0	.0	3
Tampa [1]	35	5	61	30.07	30.11	−.01	64.4	+3.3	83	25	72	36	17	56	29	59	57	85	2.90	+.8	10	9.2	n.	27	sw.	16	10	12	9	5.5	.0	.0	1
East Gulf States							**51.1**	**+1.2**										**82**	**6.55**	**+1.7**									**6.2**			
Atlanta [1]	1,173	5	72	28.85	30.12	−.04	43.8	−.4	69	1	52	19	14	35	31	39	35	77	5.32	+.5	14	11.2	nw.	46	w.	1	11	5	15	6.2	.0	.0	2
Macon [2]	370	79	87	29.71	30.11	−.05	48.5	+1.0	75	1	58	21	14	38	36	43	39	79	5.54	+1.6	15	7.0	nw.	27	nw.	1	11	6	14	5.5	.0	.0	2
Thomasville	273	49	58	29.83	30.13	−.02	54.9	+2.4	82	27	69	27	17	41	39	...	...	...	4.52	+.2	9	.....	...	...	.....	...	...	12	3	16	.....	.0	.0	2
Apalachicola	35	11	51	30.07	30.11	.....	56.6	+.9	79	4	64	33	17	49	28	54	51	86	5.27	+.2	9	8.7	n.	27	e.	21	8	11	12	5.8	.0	.0	4
Pensacola	56	54	79	30.05	30.11	−.04	55.0	+1.0	76	1	64	31	17	47	32	51	49	84	5.52	+.9	11	8.4	n.	26	w.	22	9	9	13	6.0	.0	.0	5
Anniston	741	9	...	.....	.....	.....	45.6	+1.4	73	1	55	19	14	36	35	...	...	...	8.46	+3.4	14	.....	se.	...	.....	...	5	12	14	.....	.0	.0	1
Birmingham [2]	700	11	48	29.36	30.12	−.04	46.8	+.4	73	25	56	26	14	38	37	41	38	82	11.03	+5.9	13	8.3	n.	34	se.	22	9	5	17	6.4	.0	.0	4
Mobile [2]	57	6	30	30.06	30.11	−.04	53.7	+1.5	79	1	63	32	17	45	35	49	47	87	7.80	+2.8	10	7.5	n.	24	n.	16	7	6	18	6.5	T	.0	5
Montgomery [2]	218	92	105	.....	.....	.....	50.8	+1.4	80	1	60	29	17	41	42	45	42	79	8.10	+3.3	14	7.9	n.	34	sw.	1	9	8	14	6.1	.0	.0	4
Meridian [2]	375	67	92	29.71	30.11	−.05	49.6	+1.9	77	25	60	26	17	39	38	44	41	83	7.72	+2.5	11	6.8	n.	26	nw.	1	6	10	15	6.6	.0	.0	5
Vicksburg [2]	247	82	102	29.84	30.11	−.04	50.4	+.4	79	25	59	34	17	42	34	43	40	83	5.59	+.3	11	9.2	n.	30	nw.	1	7	6	18	6.6	.0	.0	3
New Orleans [2]	53	76	84	30.04	30.10	−.03	57.6	+2.0	79	25	66	40	17	50	26	52	50	82	3.77	−1.0	8	7.3	se.	19	w.	1	10	7	14	5.9	.0	.0	3
West Gulf States							**51.7**	**+1.7**										**80**	**2.73**	**−0.3**									**5.6**			
Shreveport [1]	249	92	227	29.82	30.09	−.04	48.4	+.3	79	25	58	29	30	38	36	44	42	83	2.06	−2.2	11	9.8	se.	34	nw.	1	9	4	18	6.6	T	.0	2
Bentonville	1,303	12	51	28.71	30.12	−.01	39.0	+1.5	69	25	47	21	2	31	31	...	...	...	3.05	+.7	11	7.6	s.	18	n.	15	6	10	15	.....	T	.0	2
Fort Smith	463	57	82	29.58	30.07	−.06	42.8	+.7	68	26	50	29	14	36	33	38	34	72	5.06	+2.3	13	8.0	e.	26	nw.	15	6	8	17	6.9	.8	.0	1
Little Rock [1]	357	94	102	29.71	30.11	−.03	43.1	−1.1	73	25	51	25	14	35	33	40	37	82	4.71	+.6	11	8.7	sw.	32	se.	26	5	6	20	7.2	T	.0	4
Austin [1]	605	11	41	29.42	30.07	.....	53.5	+2.5	80	26	65	30	29	42	35	48	44	77	1.53	−1.1	7	9.1	n.	33	ne.	5	14	6	11	4.7	.0	.0	2
Brownsville [2]	57	88	96	29.96	30.02	.....	65.0	+3.8	88	1	76	31	29	54	43	60	57	81	.40	−1.5	4	8.9	se.	26	se.	9	9	12	10	5.5	.0	.0	.0
Corpus Christi [2]	20	11	78	30.03	30.06	−.06	62.6	+4.6	82	24	71	37	28	54	31	56	53	83	.09	−1.4	3	10.0	s.	29	s.	26	13	7	11	4.8	.0	.0	1
Dallas [1]	512	6	46	29.52	30.08	.....	47.8	.....	75	15	58	27	28	38	36	43	40	78	3.03	+.7	7	10.4	s.	34	s.	25	11	6	14	5.5	T	.0	1
Fort Worth [1]	679	35	56	29.35	30.08	−.04	47.5	+1.0	76	26	57	26	29	38	35	42	39	78	1.59	−.3	6	11.0	se.	38	nw.	27	14	3	14	5.1	T	.0	1
Galveston [2]	54	106	114	30.02	30.08	−.04	58.4	+2.0	77	5	64	37	28	52	27	54	52	85	2.21	−1.5	9	10.8	se.	33	nw.	27	9	14	8	5.5	.0	.0	4
Houston [2]	138	157	190	29.92	30.08	.....	57.0	+2.6	80	24	66	35	28	48	31	51	48	82	3.43	−.8	8	10.8	se.	33	se.	26	12	8	11	5.2	.0	.0	1
Palestine	510	64	72	29.54	30.08	−.04	51.1	+1.2	79	25	60	29	28	42	33	46	42	76	3.91	+.2	12	8.2	s.	26	se.	26	10	10	11	5.5	.4	.0	2
Port Arthur	34	59	134	30.05	30.08	.....	56.6	.....	78	3	65	37	28	48	27	53	50	84	6.56	+1.3	10	13.7	n.	45	s.	21	10	10	11	5.1	.0	.0	6
San Antonio [1]	93	28	69	29.33	30.07	−.04	55.0	.....	86	3	69	26	29	41	44	48	44	73	.64	−1.0	7	6.3	n.	24	ne.	6	14	7	10	4.8	.0	.0	0

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max. + mean min. ÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer	Mean temperature of the dewpoint	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
Ohio Valley and Tennessee	*Ft.*	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	*° F*	*° F.*	*° F*		*° F*	*° F*		*° F*	*° F*	*° F*	*° F*	*%*	*In.*	*In.*		*Miles*								*0–10*	*In.*	*In.*	
							33.2	**−2.5**										**83**	**5.04**	**+1.5**										**7.8**			
Chattanooga [1]	762	21	54	29.30	30.13	−.03	39.6	−1.3	65	28	48	13	14	31	38	36	33	82	11.69	+6.6	14	7.6	ne.	36	nw.	1	4	8	19	7.5	T	.0	3
Knoxville [2]	995	66	84	29.04	30.12	−.04	38.9	−1.4	71	27	47	13	14	31	28	36	32	80	8.30	+3.8	17	8.5	ne.	38	sw.	2	5	10	16	7.0	6.1	.0	1
Memphis [2]	399	78	86	29.67	30.11	−.04	42.4	−1.2	73	25	50	24	14	34	30	39	36	82	5.04	+.5	12	8.2	e.	27	sw.	27	6	10	15	6.8	T	.0	2
Nashville [1]	546	5	72	29.52	30.11	−.04	39.6	.....	72	26	47	10	4	32	33	36	33	79	6.06	+1.9	13	9.1	s.	34	nw.	2	4	7	20	7.8	2.4	.0	2
Lexington	989	6	.....	29.02	30.14	.00	33.9	−1.9	71	26	42	5	3	26	30	.....	.....	.....	6.59	+2.8	17	.....	s.	.....	.....	.....	4	10	17	7.2	6.7	.0	0
Louisville [2]	525	106	120	29.53	30.11	−.03	34.2	−3.4	70	26	41	8	13	28	28	31	28	81	4.77	+1.0	14	9.1	ne.	34	sw.	17	5	4	22	8.0	7.1	.0	1
Evansville [1]	431	5	38	29.64	30.11	−.02	32.9	−1.9	73	26	40	3	14	26	36	31	28	82	2.80	−.7	13	8.4	nw.	31	w.	2	4	7	20	7.6	6.5	.0	0
Indianapolis [2]	823	98	129	29.18	30.10	−.02	28.2	−4.0	60	27	34	2	3	22	26	25	23	88	1.70	−1.3	15	8.7	w.	27	w.	2	6	2	23	7.9	7.3	.0	1
Terre Haute [2]	575	68	149	29.48	30.13	.....	29.4	.....	66	26	36	3	13	23	28	27	24	86	1.48	−1.4	15	10.0	nw.	31	nw.	17	3	6	22	8.1	9.5	.0	1
Cincinnati [2]	627	11	51	29.41	30.11	−.02	31.2	−2.2	65	27	38	2	21	25	25	30	27	83	4.44	+1.5	16	8.5	sw.	31	w.	2	4	4	23	8.1	15.5	.0	1
Columbus [2]	822	90	110	29.19	30.10	−.02	29.1	−3.3	60	27	36	−2	21	23	27	26	24	86	3.28	+.6	18	10.1	s.	39	sw.	2	4	4	23	8.0	8.0	.0	1
Dayton [2]	900	186	213	29.10	30.10	.....	29.3	−3.3	63	27	36	−2	21	23	30	25	23	87	3.12	+.4	15	10.2	sw.	34	w.	2	4	4	23	8.1	7.5	.0	0
Elkins [2]	1,947	61	78	27.98	30.10	−.02	31.1	−1.6	60	28	40	−15	21	23	44	27	24	82	5.50	+2.0	21	7.6	w.	30	w.	2	1	5	25	8.6	25.9	1.8	0
Parkersburg	637	77	84	29.40	30.11	−.03	32.2	−3.0	60	27	39	−6	21	25	32	30	26	80	5.16	+2.1	18	6.5	se.	30	nw.	17	5	4	22	7.8	11.5	T	0
Pittsburgh [1]	1,842	39	54	29.15	30.07	−.04	28.2	−4.1	58	29	34	0	21	22	26	26	24	84	5.61	+2.8	20	12.2	w.	38	w.	2	2	4	25	8.2	11.6	1.0	0
Lower Lake Region							**24.7**	**−4.1**										**84**	**3.95**	**+1.2**									**8.4**			
Buffalo [2]	768	243	280	29.16	30.03	−.03	25.2	−4.6	46	29	30	−7	20	20	18	24	20	81	5.01	+1.6	21	18.4	w.	61	w.	2	2	5	24	8.6	26.7	5.2	0
Canton	448	10	61	29.49	29.99	.....	17.3	−5.4	39	1	26	−37	20	9	38	16	14	88	5.33	+2.6	16	9.6	w.	30	w.	3	6	2	23	7.7	24.5	13.5	0
Ithaca	836	77	100	.....	.....	.....	25.0	−4.0	42	2	31	−14	20	19	.....	.....	.....	.....	5.56	+3.2	17	10.3	nw.	30	s.	27	1	5	25	.....	15.2	6.0	0
Oswego	335	71	85	29.63	30.02	−.04	24.2	−4.8	40	11	30	−20	20	18	27	23	18	75	5.54	+2.0	20	12.6	se.	38	w.	3	3	0	28	9.0	25.5	2.9	0
Rochester [1]	523	5	69	29.44	30.03	−.03	24.4	−3.4	41	29	30	−16	20	18	29	23	21	85	4.48	+1.8	20	12.5	w.	44	w.	3	1	4	26	8.9	18.5	6.0	0
Syracuse [1]	596	5	51	29.35	30.03	−.04	23.6	−3.8	42	25	30	−26	20	17	29	22	19	84	6.55	+3.5	18	12.1	sw.	45	sw.	3	2	4	25	8.4	13.4	2.1	0
Erie [2]	714	57	81	29.25	30.05	−.02	28.4	−3.5	47	28	33	4	20	24	20	25	23	86	2.08	−.8	15	11.0	sw.	36	se.	27	1	1	29	9.4	14.5	3.6	0
Cleveland [1]	762	27	54	29.21	30.07	−.02	26.8	−2.3	52	28	32	1	20	21	21	25	22	84	2.94	+.5	19	12.4	sw.	47	sw.	2	1	6	24	8.5	9.4	.5	0
Sandusky	629	5	67	.....	.....	.....	26.8	−4.4	54	27	32	5	20	21	23	.....	.....	.....	2.43	+.2	16	10.4	sw.	35	sw.	2	6	4	21	7.6	8.9	.2	0
Toledo [2]	628	79	87	29.37	30.08	.00	25.5	−4.9	52	27	30	3	20	21	19	22	20	84	2.06	−.3	16	10.5	w.	37	w.	2	4	6	21	7.9	8.5	T	1
Fort Wayne [1]	857	69	84	29.13	30.09	.....	23.3	−5.3	54	27	30	−5	21	17	31	22	20	89	2.01	−.6	13	9.5	w.	36	w.	2	4	5	22	8.0	7.9	.0	1
Detroit [1]	730	5	78	29.24	30.06	−.01	25.6	−3.3	43	27	30	0	20	21	22	24	21	82	3.42	+1.1	17	11.2	sw.	37	w.	2	4	6	21	8.1	9.2	T	0
Upper Lake Region							**20.8**	**−3.1**										**84**	**2.73**	**+0.8**									**8.2**			
Alpena	609	5	89	29.32	30.01	−.01	23.0	−1.8	37	27	28	−5	20	18	22	22	20	87	3.44	+1.4	20	11.5	sw.	32	nw.	2	0	4	27	9.1	17.2	5.3	0
Escanaba	612	51	72	29.35	30.04	+.01	19.5	−2.9	34	23	26	−9	19	14	19	18	15	80	2.60	+.8	18	11.2	nw.	33	nw.	2	3	6	22	8.0	20.0	10.9	0
Grand Rapids [2]	707	70	244	29.24	30.06	+.01	26.4	−2.1	50	27	30	7	20	22	18	23	21	84	2.59	.0	16	11.6	sw.	33	w.	2	4	3	24	8.4	11.5	T	2
Lansing [2]	878	5	90	29.07	30.06	.....	23.6	−3.6	43	27	28	−1	20	19	26	22	20	86	3.06	+1.0	14	9.5	sw.	27	w.	2	2	7	22	8.1	13.0	T	0
Ludington	637	60	66	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Marquette	734	44	73	29.20	30.03	+.01	20.5	−2.1	34	23	25	1	19	16	15	18	15	78	3.58	+.9	16	9.2	w.	35	sw.	21	1	5	25	8.7	38.6	26.0	0
Sault Sainte Marie [1]	614	11	43	29.31	30.01	+.01	16.2	.....	33	23	23	−15	19	9	25	16	13	81	3.11	+.9	25	12.5	e.	37	nw.	2	1	6	24	8.6	33.7	13.0	0
Chicago [1]	673	19	38	29.33	30.09	+.01	23.0	−3.9	54	27	30	−2	3	16	31	21	19	87	2.71	+.6	12	10.8	sw.	32	w.	2	5	8	18	7.6	10.1	.0	1
Green Bay	617	109	141	29.37	30.08	+.04	18.6	−3.7	34	23	24	−6	19	13	21	18	15	85	2.25	+.5	11	10.6	sw.	29	n.	27	4	4	23	7.8	14.2	4.0	0
Milwaukee [1]	681	33	66	29.32	30.08	+.02	20.1	−4.6	39	27	27	−1	19	14	24	19	16	79	2.55	+.8	10	13.3	nw.	40	ne.	27	6	4	21	7.6	8.1	.1	1
Duluth	1,133	5	47	28.80	30.09	+.04	12.3	−3.6	33	23	19	−16	20	6	25	10	8	93	1.37	+.2	15	12.8	nw.	41	nw.	2	5	5	21	7.7	16.8	7.4	0
North Dakota							**10.2**	**−1.8**										**88**	**0.56**	**0.0**									**7.5**			
Fargo	940	5	43	29.05	30.14	+.06	7.6	−3.9	33	17	18	−25	13	−2	50	7	5	88	.65	−.1	15	11.2	nw.	32	se.	28	4	7	20	7.5	9.2	6.6	0
Bismarck [1]	1,677	4	41	28.23	30.11	+.03	12.6	−.2	41	17	23	−19	20	2	41	12	10	87	.48	−.1	7	9.1	e.	40	nw.	17	6	4	21	7.4	7.0	1.7	0
Devils Lake	1,478	11	44	28.44	30.11	+.05	6.0	−3.5	32	28	16	−20	12	−4	41	5	4	90	.55	.0	9	8.0	nw.	24	n.	17	2	7	22	8.0	9.0	6.2	0
Lemmon, S. Dak.	2,602	4	38	27.23	30.07	.....	18.8	.....	49	16	29	−17	2	9	36	17	15	90	.20	.....	3	.....	nw.	.....	.....	.....	3	8	20	.....	4.0	.5	0
Grand Forks	832	11	71	29.84	30.15	.....	4.4	.....	32	23	15	−28	20	−6	49	4	2	.....	.89	.....	13	.....	nw.	.....	.....	.....	5	8	18	.....	14.1	13.1	0
Williston	1,878	42	50	28.00	30.06	.00	14.4	+.6	43	22	24	−18	10	5	41	14	12	87	.54	.0	11	6.5	se.	26	nw.	17	5	7	19	7.1	6.1	1.8	0
Upper Mississippi Valley							**24.1**	**−3.6**										**85**	**2.28**	**+0.6**									**7.3**			
Minneapolis-St. Paul, Minn. [1]	919	32	61	29.06	30.11	+.03	15.4	.....	37	23	23	−8	13	8	29	15	11	79	.85	−.1	8	9.8	nw.	27	s.	21	5	6	20	7.5	7.0	6.0	0
Springfield, Minn.	1,025	4	42	28.96	30.12	.....	15.2	.....	40	23	24	−13	20	6	32	14	11	83	.59	.....	10	.....	nw.	.....	.....	.....	4	11	16	.....	11.0	1.6	0
La Crosse [2]	714	11	48	29.30	30.11	+.03	18.2	−4.1	38	23	25	−6	13	12	24	16	13	86	1.86	+.5	8	5.6	s.	17	s.	21	4	4	23	7.9	10.1	8.5	0
Madison [2]	974	70	78	29.00	30.10	+.02	18.0	−4.8	35	26	24	−4	19	12	22	17	16	90	1.86	+.2	11	8.8	nw.	32	ne.	27	4	9	18	7.3	7.5	3.3	1
Charles City	1,015	10	51	28.98	30.13	+.03	16.6	−3.8	38	23	24	−11	13	9	25	15	13	86	1.12	−.2	8	6.5	n.	19	nw.	17	9	2	20	7.0	10.2	6.2	0
Davenport [2]	606	66	161	29.43	30.14	+.04	22.6	−4.5	44	23	29	−5	13	16	27	20	19	90	3.87	+2.4	10	9.5	nw.	24	w.	2	5	7	19	7.4	6.5	T	1
Des Moines [2]	860	5	99	29.15	30.12	+.01	22.6	−3.4	47	23	30	−2	13	16	25	20	18	84	1.23	.0	11	9.6	n.	31	n.	27	6	12	13	6.5	5.6	T	0
Dubuque	699	60	79	29.33	30.12	+.02	20.6	−4.1	41	23	27	−4	3	14	26	19	16	81	1.69	+.2	10	6.4	nw.	19	nw.	17	6	4	21	7.5	8.7	2.6	0
Burlington, Iowa	702	6	35	29.32	30.11	−.01	23.0	−6.0	44	23	30	−6	13	16	28	22	19	85	3.00	+1.4	11	8.8	nw.	27	nw.	17	4	11	16	7.1	8.7	.0	2
Cairo	357	5	99	29.73	30.12	−.03	37.4	−.4	74	26	44	17	4	31	27	.....	.....	.....	2.18	−1.2	15	8.8	s.	31	sw.	17	5	5	21	7.7	2.4	.0	2
Peoria [2]	609	11	45	29.44	30.13	+.02	24.6	−3.5	59	26	32	−3	13	18	28	22	21	90	2.45	+.7	8	5.8	w.	20	w.	17	5	7	19	7.4	9.5	.0	1
Springfield, Ill. [2]	636	5	191	29.40	30.12	.00	28.0	−3.7	67	26	35	5	2	21	29	24	23	91	2.61	+.4	11	11.0	s.	32	nw.	17	4	7	20	7.5	8.1	.0	1
St. Louis [3]	568	179	303	29.49	30.12	−.01	33.3	−1.6	71	26	40	7	2	27	29	30	26	77	4.61	+2.4	13	11.3	nw.	30	sw.	17	6	9	16	7.0	10.2	.0	0
Missouri Valley							**25.4**	**−1.3**										**83**	**2.14**	**+1.0**									**7.0**			
Columbia, Mo. [2]	784	6	66	29.24	30.10	−.02	31.3	−1.9	69	26	38	6	2	24	30	28	26	85	4.51	+2.6	11	7.5	n.	23	nw.	1	8	9	14	6.5	7.6	.0	1
Kansas City [1]	963	38	76	29.05	30.12	.00	30.9	.....	55	17	37	9	2	25	24	28	25	80	2.43	+1.1	8	9.9	ne.	30	nw.	1	8	8	15	6.5	10.0	.0	1
St. Joseph [2]	967	11	49	29.05	30.13	.....	28.3	−1.3	52	23	34	7	2	22	21	26	24	89	2.50	+1.2	6	8.4	w.	27	nw.	1	10	5	16	6.8	9.4	T	1
Springfield, Mo. [1]	1,324	5	60	28.65	30.09	−.04	35.7	.....	65	26	43	15	2	28	33	32	30	83	5.75	+3.4	13	11.1	se.	32	nw.	1	5	7	19	7.4	6.4	.0	1
Topeka	987	65	87	29.03	30.12	.....	30.4	−1.6	57	17	37	10	2	24	25	28	25	83	2.74	+1.8	10	8.1	w.	26	ne.	27	7	8	16	6.8	12.1	.1	1
Lincoln [2]	1,189	11	81	28.80	30.12	.00	25.5	−2.1	48	17	32	2	6	19	29	23	21	84	1.66	+.9	7	8.8	s.	30	n.	26	3	10	18	7.6	10.0	1.0	0
Omaha [1]	1,105	31	44	28.90	30.13	+.02	24.2	−2.2	47	17	31	2	2	17	26	23	20	84	.56	−.4	7	10.9	s.	37	nw.	17	4	7	20	7.8	7.0	1.2	0
Valentine	2,598	46	54	27.26	30.07	−.03	27.2	+2.6	53	30	39	−10	2	16	42	24	19	73	.11	−.5	3	8.0	w.	26	nw.	1	9	6	16	6.3	.7	.0	0
Sioux City [1]	1,138	5	27	28.86	30.13	+.01	19.8	−1.8	46	17	29	−7	2	11	35	19	17	85	.82	−.1	7	9.5	nw.	32	nw.	17	6	6	19	7.3	2.2	.5	0
Huron [1]	1,301	5	41	28.66	30.13	+.03	16.4	−2.3	46	17	26	−10	20	6	35	14	12	88	.30	−.3	9	10.8	nw.	36	nw.	17	7	6	18	6.7	5.7	1.8	0
Northern Slope							**27.6**	**+4.0**										**78**	**0.49**	**−0.2**									**7.2**			
Billings [1]	3,570	18	39	26.24	30.00	.....	30.2	+4.0	60	16	39	4	26	21	33	26	21	72	.12	.....	4	11.5	sw.	36	w.	16	2	12	17	7.1	1.7	.0	0
Havre	2,507	11	67	27.29	30.02	−.03	20.4	.0	52	16	30	−13	5	11	42	19	15	79	.02	−.6	2	8.5	sw.	29	sw.	22	5	8	18	7.3	.7	.0	0
Helena [1]	4,124	5	35	25.73	30.06	−.07	27.7	+5.0	60	16	36	−4	5	19	29	25	21	74	.29	−.5	6	8.4	w.	42	w.	16	2	5	24	8.2	3.1	T	0
Missoula [2]	3,205	80	91	26.62	30.10	.....	29.6	+5.1	52	16	35	7	26	24	23	26	24	92	1.50	+.4	18	5.1	sw.	24	sw.	22	0	6	25	8.9	12.7	1.7	0
Kalispell	2,973	48	56	26.88	30.01	−.06	28.2	+3.3	52	16	34	4	26	22	24	27	25	85	1.51	+.1	18	4.4	w.	27	sw.	31	0	5	26	9.1	18.5	2.0	0
Miles City [2]	2,371	48	55	27.47	30.05	−.05	25.4	+4.4	62	16	35	−12	6	16	30	21	17	78	.13	−.5	4	5.1	e.	23	nw.	16	8	9	14	6.2	2.2	T	0
Rapid City [2]	3,259	50	58	26.57	30.05	−.04	27.9	+1.0	59	16	38	1	2	18	32	24	21	81	.36	−.1	6	12.0	nw.	56	nw.	1	8	12	11	6.1	3.0	.0	0
Cheyenne [1]	6,094	5	39	23.93	30.06	−.03	31.6	.....	59	17	43	−1	27	20	38	25	19	64	.22	−.3	5	13.6	nw.	46	nw.	31	7	11	13	6.0	4.3	.0	0
Lander	5,352	60	68	24.60	30.07	−.08	27.4	+7.0	57	16	40	−6	27	15	41	23	17	66	.15	−.5	2	5.0	sw.	32	w.	31	6	20	5	5.6	2.1	T	0
Sheridan [3]	3,790	6	42	26.03	30.04	.....	28.3	+5.5	58	16	39	−4	6	18	31	24	20	79	.55	−.1	8	6.4	nw.	34	nw.	11	1	6	24	8.1	5.1	.5	0
North Platte [2]	2,821	11	51	27.06	30.08	−.02	31.2	+4.5	58	16	42	3	6	21	44	26	23	83	.15	−.4	3	6.9	w.	24	n.	26	8	9	14	6.6	.9	.0	0

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station, reduced to mean of 24 hours	Pressure: Sea level, reduced to mean of 24 hours	Pressure: Departure from normal	Temperature of the air: Mean max. + min. ÷2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean wet thermometer temperature of the dewpoint	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
Middle Slope	*Ft.*	*Ft.*	*Ft.*	*In.*	*In.*	*In.*	°F.	°F.	°F		°F	°F		°F	°F	°F	°F	%	*In.*	*In.*		*Miles*							*0–10*	*In.*	*In.*	
							35.3	**+1.7**									**75**	**1.48**	**+0.5**										**6.0**			
Denver [1]	5,292	106	113	24.68	30.02	−.06	37.0	+7.1	63	13	48	12	6	26	42	28	18	52	.35	−.4	3	7.6	s.	28	w.	31	9	16	6	4.9	4.5	.0	0
Pueblo [1]	4,690	5	36	25.26	30.05	−.03	35.7	+5.6	74	17	52	7	27	20	50	27	19	59	.49	.0	2	8.5	w.	43	w.	31	11	14	6	4.9	4.6	.0	0
Concordia	1,392	50	58	28.60	30.13	+.02	28.6	−2.1	60	17	36	4	6	22	29	26	24	83	1.74	+1.1	6	7.2	n.	26	n.	26	5	4	22	7.5	10.3	1.5	1
Dodge City [1]	2,509	10	86	27.41	30.08	−.02	32.1	−.5	62	17	41	6	6	23	34	29	26	85	.88	+.3	7	12.7	sw.	45	n.	26	6	11	14	6.5	10.8	T	0
Wichita [1]	1,358	6	64	28.62	30.10	−.01	32.4	−2.2	63	17	40	14	6	25	30	30	28	88	3.14	+2.1	8	11.7	n.	40	n.	27	7	8	16	6.8	14.8	2.0	1
Oklahoma City [1]	1,214	10	47	28.77	30.08	−.03	40.8	+1.5	68	18	49	21	29	32	30	36	33	80	2.07	+.6	7	8.8	s.	26	n.	27	14	2	15	5.5	4.8	.0	1
Tulsa	674	10	61	29.34	30.08	.....	40.3	+2.8	68	17	48	22	2	32	33	36	32	78	1.71	−.2	9	10.2	n.	33	n.	27	9	6	16	6.2	2.6	.0	1
Southern Slope							**46.7**	**+2.6**									**71**	**1.48**	**+0.6**										**4.5**			
Abilene [2]	1,738	10	56	28.22	30.05	−.06	47.8	+1.8	76	25	59	26	28	36	40	40	36	74	2.54	+1.2	5	9.5	s.	24	w.	15	16	3	12	4.6	T	.0	1
Amarillo [2]	3,676	10	49	26.26	30.05	−.04	38.0	+1.0	70	17	50	12	8	26	39	32	29	78	1.19	+.4	6	12.3	sw.	42	n.	27	12	9	10	5.0	6.0	T	0
Del Rio	960	63	71	29.03	30.03	−.07	55.7	+3.5	85	3	68	30	28	44	39	48	42	66	.39	−.3	5	8.1	e.	32	nw.	27	18	4	9	3.8	.0	.0	0
Roswell	3,566	75	85	26.39	30.04	−.03	45.2	+4.0	81	2	60	19	28	30	47	37	30	65	1.78	+1.1	4	6.8	s.	31	ne.	27	13	9	9	4.5	4.5	.0	0
Southern Plateau							**49.8**	**+4.6**									**53**	**0.63**	**−0.1**										**3.3**			
El Paso [2]	3,778	82	101	26.22	30.04	+.01	47.7	+2.8	72	2	61	25	29	35	38	39	32	60	1.26	+.7	4	7.5	w.	30	sw.	25	15	11	5	4.0	.0	.0	0
Albuquerque [1]	5,314	5	45	24.76	30.04	.....	40.8	+6.3	68	2	52	22	7	30	34	34	27	64	1.10	+.6	8	7.4	n.	30	nw.	25	14	8	9	4.5	T	.0	2
Flagstaff	6,907	10	59	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Phoenix [2]	1,107	39	87	28.87	30.04	.00	56.0	+4.0	79	15	70	35	8	42	37	44	35	56	.36	−.6	2	4.1	e.	28	sw.	25	17	7	7	3.5	.0	.0	0
Tucson [1]	2,555	5	23	27.40	30.03	.....	54.2	.....	78	17	69	29	28	40	41	43	31	46	.47	−.5	4	.....	se.	.....	.....	.....	18	7	6	3.1	.0	.0	1
Yuma	142	9	54	29.89	30.04	−.01	59.0	+3.8	80	15	72	39	10	45	34	47	35	46	.01	−.5	1	5.6	n.	31	w.	25	23	6	2	1.3	.0	.0	0
Independence	3,957	5	26	26.06	30.14	+.02	45.3	+6.0	70	15	60	19	9	31	37	35	23	45	.56	−.2	4	.....	.....	.....	.....	.....	24	7	0	.....	.0	.0	0
Middle Plateau							**34.4**	**+4.6**									**72**	**0.73**	**−0.2**										**7.1**			
Reno [2]	4,527	61	76	25.54	30.17	+.02	36.6	+3.3	61	2	49	14	26	24	33	32	28	73	.56	−.4	8	6.7	sw.	40	s.	28	1	10	20	7.7	.4	.0	0
Tonopah	6,090	9	20	24.08	30.12	.....	37.2	.....	60	1	46	9	26	28	26	32	24	62	.03	−.3	2	.....	nw.	.....	.....	.....	20	9	2	.....	1.0	.0	0
Winnemucca	4,339	5	56	25.70	30.17	−.01	33.8	+3.8	57	1	42	13	26	26	27	32	30	84	1.81	+.7	10	8.1	sw.	33	s.	28	2	6	23	8.4	2.4	.0	0
Modena	5,473	10	46	.....	30.16	+.04	33.8	+5.7	59	1	47	9	27	20	.....	.....	.....	72	.43	−.4	2	8.3	w.	30	nw.	24	13	12	6	.....	T	.0	1
Salt Lake City [1]	4,227	86	47	25.70	30.18	+.03	33.2	+3.0	58	31	40	16	27	26	23	31	27	80	1.48	+.1	9	7.0	se.	28	se.	24	4	4	23	7.9	2.1	.0	1
Grand Junction	4,602	60	68	25.44	30.09	−.01	34.7	+7.2	54	20	47	16	6	23	35	28	21	59	.08	−.6	1	4.5	se.	20	n.	24	13	13	5	4.3	.2	.0	1
Northern Plateau							**32.4**	**+2.5**									**87**	**2.18**	**+0.5**										**8.9**			
Baker [2]	3,471	36	54	26.48	30.15	−.01	29.6	+2.3	46	31	36	5	4	24	24	27	26	93	1.91	+.2	19	5.4	s.	26	sw.	31	0	4	27	9.2	14.0	T	0
Boise [1]	2,739	5	49	27.26	30.17	−.03	33.4	+3.1	48	31	39	17	26	28	22	32	30	87	2.75	+1.2	14	10.7	se.	34	nw.	25	2	3	26	8.6	1.0	.0	0
Pocatello [1]	4,478	5	31	25.53	30.17	−.02	30.2	+4.9	47	31	36	1	27	24	30	28	26	83	1.09	−.1	15	11.2	sw.	33	w.	2	2	8	21	8.2	4.3	.0	0
Spokane [1]	1,929	27	42	27.97	30.05	−.03	32.4	+1.9	45	16	37	16	26	28	18	31	30	89	1.70	−.5	19	5.9	sw.	30	s.	22	1	1	29	9.4	10.6	.0	0
Walla Walla	991	57	65	28.99	30.07	−.05	38.8	+3.3	64	16	45	24	4	33	34	.....	.....	.....	3.62	+1.6	21	5.6	s.	23	s.	22	1	1	29	9.3	10.7	.0	0
Yakima	1,076	58	67	28.88	30.07	.....	30.0	−.7	53	22	36	15	4	24	22	29	27	85	2.01	+.7	13	3.3	nw.	19	s.	22	2	5	24	8.7	17.7	8.3	0
North Pacific Coast Region							**43.6**	**+2.0**									**86**	**8.55**	**+1.4**										**8.9**			
North Head	211	5	56	29.76	30.00	−.03	44.6	+.5	58	15	49	32	6	40	13	44	42	89	8.83	−.6	28	15.7	se.	65	s.	21	1	7	23	8.4	T	.0	2
Seattle [2]	125	90	321	29.86	30.00	−.01	44.4	+2.7	56	13	48	33	25	41	13	42	39	83	5.21	−.4	18	11.5	se.	45	sw.	30	1	5	25	8.7	T	.0	1
Tacoma	194	172	201	29.79	30.01	.00	43.6	+3.0	56	16	48	32	25	40	13	43	40	80	4.80	−1.9	20	9.0	s.	37	s.	21	1	6	24	8.4	T	.0	0
Tatoosh Island	86	9	61	29.84	29.94	−.02	43.5	−.4	52	12	47	33	5	40	13	42	39	86	12.11	−1.2	28	16.3	e.	59	s.	21	0	6	25	8.8	.9	.0	1
Medford [1]	1,329	29	58	28.71	30.16	.....	39.7	+1.6	56	31	44	27	4	35	19	39	38	91	5.87	+2.8	22	.....	nw.	17	nw.	28	0	3	28	9.4	T	.0	0
Portland, Oreg. [1]	154	68	106	29.88	30.05	−.02	44.2	+3.0	57	1	48	33	6	40	17	42	40	90	11.07	+4.4	21	5.9	se.	23	s.	29	0	3	28	9.5	3.2	.0	0
Roseburg	510	45	76	29.55	30.11	.00	45.2	+3.4	59	1	51	32	4	40	16	44	42	86	11.95	+6.6	23	3.6	s.	18	sw.	6	0	6	25	8.8	T	.0	0
Middle Pacific Coast Region							**48.3**	**+0.4**									**83**	**5.23**	**+0.5**										**7.6**			
Eureka	60	72	88	30.10	30.17	+.05	49.8	+1.6	62	15	55	36	3	45	17	48	46	88	8.52	+2.2	22	7.3	se.	32	sw.	23	2	8	21	8.1	.0	.0	0
Redding	722	20	34	29.38	30.17	.....	45.1	−1.0	71	14	51	31	5	39	28	42	38	78	6.36	+.8	16	6.5	nw.	23	nw.	25	5	5	21	7.9	T	.0	0
Sacramento [2]	66	92	115	30.11	30.18	+.04	46.2	.0	65	1	52	33	26	40	23	44	42	86	3.16	+.1	9	6.2	se.	26	nw.	25	3	4	24	8.3	.0	.0	0
San Francisco	155	112	132	29.99	30.16	+.04	52.1	+.8	68	14	57	43	21	47	18	49	46	80	2.87	−1.1	9	5.9	n.	26	sw.	23	8	10	13	6.1	.0	.0	0
South Pacific Coast Region							**54.1**	**+1.7**									**72**	**1.05**	**−0.9**										**4.9**			
Fresno [1]	327	5	35	29.79	30.16	+.03	45.9	+.8	64	2	53	30	26	39	25	44	42	86	1.44	.0	9	4.0	nw.	31	nw.	25	4	8	19	7.5	.0	.0	0
Los Angeles	338	223	250	29.72	30.08	+.01	58.8	+2.2	85	15	68	41	20	49	31	49	40	57	1.01	−1.6	4	6.5	ne.	33	nw.	25	19	6	6	3.5	.0	.0	1
San Diego [1]	87	20	55	29.99	30.09	+.02	57.5	+2.0	77	15	67	42	26	48	30	51	47	72	.69	−1.2	6	5.2	n.	26	sw.	25	16	10	5	3.6	.0	.0	0
West Indies																																
San Juan, P. R.	82	10	54	29.90	29.90	.....	77.8	+1.5	90	17	82	69	31	73	16	73	71	80	3.02	−2.5	18	13.8	e.	30	ne.	20	2	27	2	5.4	.0	.0	0
Panama Canal																																
Balboa Heights	118	6	92	.....	[3]29.85	+.03	79.4	−.6	90	24	86	70	24	73	20	.....	.....	[3]90	11.23	+6.5	20	4.4	nw.	21	n.	26	0	21	10	6.8	.0	.0	5
Cristobal	27	47	97	.....	[3]29.86	+.02	80.5	−.6	90	2	86	73	1	75	15	75	74	[3]83	23.75	+12.1	19	6.4	w.	24	nw.	14	2	8	21	7.6	.0	.0	0
Alaska																																
Fairbanks	454	11	87	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Juneau	80	96	116	.....	[4]29.74	.....	23.8	−7.4	47	12	28	7	18	20	.....	22	18	76	4.60	−2.9	22	7.8	se.	29	se.	26	4	3	24	.....	35.8	11.2	0
Nome	22	25	51	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hawaiian Islands																																
Honolulu	38	86	100	29.93	29.97	.....	75.5	+3.1	82	2	80	67	9	71	12	.....	.....	.....	**9.13**	**+5.2**	15	7.4	ne.	27	ne.	13	3	14	14	7.0	.0	.0	4

LATE REPORTS FOR NOVEMBER 1942

Alaska																																
Bethel	22	5	32	[4]29.86	[4]29.90	.....	13.2	−3.8	40	4	20	−20	26	6	33	14	9	77	1.24	+.2	14	.....	n.	.....	.....	.....	7	7	16	6.6	12.1	3.1	.....
Gambell	27	4	30	[4]30.02	[4]30.05	.....	19.4	−5.0	36	17	23	−2	29	16	17	19	16	84	.50	.....	15	22.5	n.	51	n.	19	2	5	23	8.5	5.6	1.6	.....
Ketchikan	75	69	85	[4]29.68	[4]29.70	.....	37.5	−2.5	51	13	42	22	6	33	16	36	32	81	22.58	+2.5	20	7.2	se.	34	se.	20	4	4	22	7.9	8.3	.0	.....
Kotzebue	20	4	31	.....	.....	.....	3.3	−2.2	24	5	9	−26	28	−2	26	.....	.....	.....	.15	−.2	8	.....	e.	.....	.....	.....	9	6	15	.....	1.3	7.3	.....
McGrath	331	4	31	[4]29.50	[4]29.90	.....	−2.4	.....	31	6	6	−39	28	−11	39	−1	−3	84	.56	.....	12	.....	nw.	.....	.....	.....	10	7	13	5.9	9.3	14.0	.....

[1] Data are airport records.
[2] Barometric data (adjusted to old city elevation) and hygrometric data from airport; otherwise city office records.
[3] Observations taken bihourly.
[4] Pressure not reduced to mean of 24 hours.
[5] Barometric data from airport; other data from city office records.
[6] Wind, clear, partly cloudy and cloudy data from city office records; other data from airport.

NOTE.—Except as indicated by notes 1, 2, 5 and 6 data in table are city office records.

SOLAR RADIATION AND SUNSPOT DATA FOR DECEMBER 1942

[Solar Radiation Investigations Section, I. F. HAND in charge]

SOLAR RADIATION OBSERVATIONS

Explanations of the tables and references to descriptions of instruments, stations and methods of observation, and to summaries of data, are given in the January 1942 REVIEW, page 20.

Early in November 1942, the total solar and sky radiation equipment at the Weather Bureau office at Fairbanks, Alaska, was transferred to the University of Alaska at College, Alaska, 4 miles west of Fairbanks.

TABLE 1.—*Solar radiation intensities during December 1942*

[Gram-calories per minute per square centimeter of normal surface]

MADISON, WIS.

Date	Sun's zenith distance: 7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass: A. M.				P. M.					Local mean solar time
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Dec. 1	2.49			1.11		1.60		1.10			2.03
13	.81	0.62	0.74	.88							1.30
Means		(.62)	(.74)	(1.00)		(1.60)		(1.10)			
Departures		−.35	−.35	−.22		.00		−.11			

LINCOLN, NEBR.

Dec. 2	0.69	0.98	1.09	1.24							1.02
3	1.30	.83	.98	1.13				1.22	1.11	0.98	1.68
16	2.62			1.16							2.06
17	4.37	1.01	1.09	1.22				1.11	.94	.79	5.59
22	3.15	.92	1.04	1.16							3.99
Means		.94	1.05	1.18				(1.16)	(1.02)	(.88)	
Departures		−.02	−.05	−.06				−.03	−.04	−.07	

BLUE HILL, MASS.

Dec. 4	2.1	0.70	0.82	0.98							2.2
6	3.0			.90	1.07				0.75	0.67	3.2
7	3.3		1.01	1.15							2.7
8	3.2	1.01	1.06					1.26	1.11	.99	2.2
14	1.3								1.18	1.08	1.6
17	.4	1.10	1.20	1.33							1.1
19	1.1	1.08	1.17	1.28							1.2
25	5.3			.66				.78	.56	.48	4.8
26	3.3			1.21				1.03	.86	.68	3.0
31	3.5							1.10	1.01	.91	3.8
Means		.97	1.05	1.07	(1.07)			1.04	.91	.80	
Departures		−.06	+.01	−.11	−.27			−.11	−.13	−.18	

ALBUQUERQUE, N. MEX.

Dec. 1	2.74	1.09	1.18	1.30	1.45		1.44	1.30	1.19	1.09	2.62
2	2.87			1.30							3.00
10	2.87	1.07	1.16								3.00
12	3.15				1.44		1.45				3.45
13	3.15			1.30	1.43		1.45	1.31	1.19	1.10	3.30
15	2.62				1.43		1.41				3.00
16	2.74	1.11	1.18	1.25							3.30
24	3.99							1.25	1.12	1.03	4.37
27	2.62	1.05	1.10	1.32	1.48		1.45	1.30	1.17	1.07	3.15
28	3.00	1.13	1.21	1.32	1.46		1.46				3.15
29	3.30	1.07	1.16	1.29	1.42		1.38	1.28	1.12		4.17

*Extrapolated.

TABLE 1.—*Solar radiation intensities during December 1942*—Con.

ALBUQUERQUE, N. MEX.—Continued

Date	Sun's zenith distance: 7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass: A. M.				P. M.					Local mean solar time
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Dec. 30	3.45							1.28	1.16	1.05	4.17
31	3.30	1.03	1.16	1.22	1.41		1.39	1.27	1.16	1.06	4.37
Means		1.08	1.16	1.29	1.44		1.43	1.28	1.16	1.07	
Departures		+.01	−.01	−.01	+.01		−.01	.00	.00	+.01	

LATE DATA

TABLE 1.—*Solar radiation intensities during October and November 1942*

[Gram-calories per minute per square centimeter of normal surface]

BLUE HILL, MASS.

Date	Sun's zenith distance: 7:30 a. m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass: A. M.				P. M.					Local mean solar time
	e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e.
	mm.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*mm.*
Oct. 1	9.4	0.71	0.83	0.96				0.70	0.56	0.27	9.0
2	6.6	.82	.98				1.24	1.09	.96	.85	10.1
3	7.4						1.26	1.09	1.00	.89	9.4
4	7.4		1.00	1.16	1.31						8.0
7	8.4				1.24			.90	.73	.61	9.0
8	8.4	.93	1.04	1.16	1.29	1.37	1.20	1.03	.95	.86	8.4
10	10.9	.45	.60	.77	1.04	1.36					10.1
12	9.0	.86		1.12							8.7
13	9.4					1.41	1.32	1.14	1.02		9.4
19	8.0	.90	1.01	1.18							6.6
21	10.5				1.06						9.4
27	5.6		.99	1.10					.87	.89	3.8
28	4.6	.83	.96	1.08			1.19		.83	.70	5.1
30	10.5							1.04	.94	.83	11.7
31	14.6							.96	.84	.75	12.6
Means		.79	.93	1.07	1.27	1.38	1.24	.99	.87	.74	
Departures		−.10	−.04	−.02	+.13	.00	+.03	−.04	−.05	−.06	
Nov. 2	6.3			1.17	1.31		1.26	1.04	.88	.74	4.8
4	4.0	1.03	1.13	1.26			1.42	1.27	1.15	1.06	3.0
5	5.8	1.03	1.13	1.25							5.8
9	5.6	.96	1.06	1.20							4.0
11	5.1	.93	1.04	1.17							4.6
14	2.0	.89	.99	1.11					.93	.82	2.6
15	1.9	1.10	1.19	1.29				1.23	1.12	1.00	1.8
17	5.1	.61	.74								7.4
18	11.8									.76	11.8
19	6.3	.98	1.10	1.24							4.4
23	2.6	1.06	1.16	1.25							3.0
Means		.95	1.06	1.22	(1.31)		(1.34)	1.18	1.02	.88	
Departures		+.04	+.05	+.09	+.04		+.09	+.08	+.06	−.04	

*Extrapolated.

TABLE 2.—*Daily totals and weekly means of solar radiation (direct+diffuse) received on a horizontal surface*

[Gram-calories per square centimeter]

Date	Washington	Madison	Lincoln	Chicago	New York	East Lansing	Cambridge	Fairbanks‡	Nashville	Twin Falls	New Orleans	Riverside	Blue Hill	Ithaca	Newport	State College	Put-in-Bay	East Wareham	Davis, Calif.
	cal.	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*		
Dec. 3	277	155	244	129	199	.....	145	.....	24	198	247	72	139	181	210	222	203	181	221
4	270	116	206	198	186	.....	187	.....	171	145	198	87	197	121	209	129	107	210	222
5	112	80	75	68	174	.....	144	.....	44	228	197	264	168	19	180	144	119	173	237
6	108	155	185	189	181	.....	160	.....	33	67	109	287	161	124	189	102	145	184	51
7	115	195	92	104	175	.....	138	.....	20	154	73	288	172	186	211	128	124	170	165
8	234	121	122	146	202	.....	209	.....	22	93	63	101	220	95	222	230	156	227	149
9	183	84	64	52	38	.....	28	.....	122	106	275	264	29	47	24	79	106	18	194
Mean	**185**	**129**	**141**	**127**	**165**	.....	**145**	**0**	**62**	**142**	**166**	**195**	**155**	**110**	**178**	**148**	**137**	**168**	**177**
Departure	**+23**	**+13**	**−32**	**+47**	**+39**	.....	**+4**	**−8**	.....	**+20**	**−41**	**−15**	**+17**	**+9**	**+38**	**+30**	.....	.....	.....
10	90	48	199	13	60	.....	121	.....	66	118	157	271	147	78	123	52	51	108	238
11	80	134	114	76	64	.....	85	.....	46	183	99	238	79	125	86	112	98	85	158
12	210	137	172	85	117	101	116	.....	40	195	289	276	132	180	87	151	86	125	84
13	171	207	87	143	33	263	28	.....	82	62	352	250	22	98	20	136	237	44	250
14	199	91	117	55	169	46	209	.....	239	44	304	258	220	108	226	109	32	228	252
15	96	90	35	18	63	59	105	.....	193	49	337	270	110	36	126	26	32	109	56
16	70	125	204	108	114	204	116	.....	226	151	357	268	115	144	121	124	226	99	65
Mean	**132**	**119**	**132**	**71**	**88**	**134**	**112**	**4**	**127**	**115**	**271**	**262**	**118**	**110**	**113**	**101**	**106**	**114**	**158**
Departure	**−7**	**+5**	**−26**	**−11**	**−26**	.....	**−9**	**−1**	.....	**−5**	**+81**	**+64**	**−14**	**−12**	**−33**	**−8**	.....	.....	.....
17	159	29	199	16	164	45	202	.....	196	43	.....	182	220	98	224	104	23	232	37
18	132	166	116	98	188	109	217	.....	229	30	160	183	220	204	201	82	71	213	58
19	154	116	6	46	210	153	178	.....	210	69	306	234	211	116	230	180	200	230	24
20	.....	140	47	74	102	232	140	.....	55	187	.....	257	183	212	126	200	211	134	38
21	265	146	5	176	217	180	204	.....	184	171	152	226	233	266	232	168	192	241	114
22	161	98	209	12	85	43	75	.....	20	61	171	250	87	42	105	51	24	82	35
23	150	67	173	74	87	67	128	.....	74	57	251	170	130	13	145	19	42	143	39
Mean	**170**	**109**	**108**	**71**	**150**	**118**	**163**	**0**	**138**	**88**	**208**	**215**	**185**	**136**	**181**	**115**	**109**	**182**	**49**
Departure	**+24**	**−8**	**−62**	**−18**	**+40**	.....	**+36**	**−6**	.....	**−25**	**−3**	**−10**	**+51**	**+44**	**+43**	**+19**	.....	.....	.....
24	81	130	90	66	48	72	54	.....	113	80	227	54	57	41	93	83	43	76	107
25	144	66	6	29	89	82	147	.....	55	112	218	192	143	91	162	77	31	150	208
26	30	22	*0	9	172	18	197	.....	139	158	165	301	191	145	199	35	19	192	174
27	49	31	90	14	51	19	88	.....	41	74	59	273	104	61	125	10	48	97	156
28	34	27	87	16	19	23	30	.....	34	58	.....	270	30	55	31	25	14	36	22
29	26	87	63	20	26	41	29	.....	32	200	.....	261	26	26	21	9	15	39	201
30	48	83	72	18	20	24	16	.....	2	32	257	263	9	20	13	17	8	27	115
31	227	30	164	121	234	33	193	.....	146	91	196	272	172	91	223	43	23	224	38
Mean[1]	**80**	**59**	**72**	**42**	**94**	**39**	**94**	**0**	**80**	**101**	**187**	**236**	**92**	**66**	**108**	**38**	**29**	**105**	**135**
Departure	**−66**	**−57**	**−88**	**−39**	**−28**	.....	**−14**	**−6**	.....	**−28**	**+17**	**+33**	**−28**	**−26**	**−24**	**−48**	.....	.....	.....
ACCUMULATED DEPARTURES ON DECEMBER 31, 1942																			
	+109	−3564	−11001	+4504	−3353	.....	−5166	+4824	.....	+1106	.....	+11765	−10934	−607	−5470	.....	.....	.....	.....
PERCENTAGE DdepartureS FOR THE YEAR																			
	+0.1	−3.0	−8.2	+4.3	−2.9	.....	−4.4	+6.0	.....	+0.8	.....	+7.9	−8.8	−0.5	−4.2	.....	.....	.....	.....

[1] 8-day mean.

**Lincoln:* Dr. Blair states "the percentage of sunshine for the month of December 1942, was only 28. This is the lowest percentage of any month of our 38-year record, and checks with our very low total solar radiation."

‡*Fairbanks:* Late data values of total solar and sky radiation for November 1942, for the weeks beginning Oct. 29, Nov. 5, Nov. 12, Nov. 19, Nov. 26, are 62, 54, —, —, 12, respectively, and the corresponding departures are +18, +16, —, —, −2. (—, no record; station transferred.)

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR DECEMBER 1942

[Communicated by Capt. J. F. Hellweg, U. S. N. (Ret.), Superintendent, U. S. Naval Observatory.] All measurements and spot counts were made at the Naval Observatory from plates taken at the observatories indicated. Difference in longitude is measured from the central meridian, positive toward the west. Latitude is positive toward the north. Areas are corrected for foreshortening and expressed in millionths of Sun's hemisphere. For each day, under longitude, latitude, area of spot or group, and spot count, are included assumed longitude of center of the disk, assumed latitude of center of the disk, total area of spots and groups, and total spot count.

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1942	*h m*		°	°	°	°				
Dec. 1	10 46	7525	−66	87	−12	66	194	4	G	Mt. Wilson.
		7524	+20	173	−7	22	582	24		
		7519	+26	179	−15	30	16	1		
		7519	+27	180	−12	30	48	1		
		7518	+53	206	+7	54	388	12		
				(153)	(+1)	.....	1,228	42		
Dec. 2	11 29	7525	−52	88	−12	54	145	6	G	U. S. Naval.
		7524	+33	173	−7	35	485	19		
		7519	+40	180	−15	43	12	1		
		7519	+40	180	−13	42	48	1		
		7518	+64	204	+8	64	485	14		
				(140)	(+1)	.....	1,175	41		

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR DECEMBER 1942—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or count	Spot count	Plate quality	Observatory
1942	*h m*		°	°	°	°				
Dec. 3	10 25	7525	−39	88	−12	41	121	4	F	U. S. Naval.
		7524	+46	173	−8	47	436	12		
		7519	+53	180	−13	55	73	1		
		7518	+77	204	+8	77	436	7		
				(127)	(+1)	.....	1,066	24		
Dec. 4	10 35	7525	−28	86	−11	31	48	1	F	Do.
		7525	−26	88	−13	29	48	1		
		7524	+55	169	−7	55	48	3		
		7524	+63	177	−6	63	291	2		
		7519	+66	180	−13	67	97	1		
				(114)	(0)	.....	532	8		
Dec. 5	12 35	7527	−64	36	+21	67	97	3	F	Mt. Wilson
		7525	−13	87	−11	18	12	3		
		7525	−11	89	−13	18	48	2		
		7526	−8	92	+13	15	16	2		
		7524	+70	179	−7	70	48	2		
		7524	+79	179	−7	79	242	3		
		7519	+80	180	−13	80	48	1		
				(100)	(0)	.....	511	16		

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR DECEMBER 1942—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic				Area of spot or group	Spot count	Plate quality	Observatory
			Difference in longitude	Longitude	Latitude	Distance from center of disk				
1942	h m		°	°	°	°				
Dec. 6	11 2	7527	−51	36	+21	55	97	2	F	Mt. Wilson.
		7525	−2	85	−10	10	12	2		
		7525	+2	89	−13	13	48	1		
				(87)	(0)		157	5		
Dec. 7	12 31	7528	−72	1	+11	72	194	1	F	U. S. Naval.
		7529	−49	24	+21	51	242	12		
		7527	−38	35	+22	43	36	1		
		7525	+18	91	−12	21	24	2		
				(73)	(0)		496	16		
Dec. 8	12 3	7528	−60	0	+9	61	194	1	F	Do.
		7529	−36	24	+20	41	242	12		
		7527	−25	35	+21	32	36	1		
				(60)	(0)		472	14		
Dec. 9	10 31	7528	−48	0	+9	50	194	1	G	Do.
		7529	−23	25	+19	30	194	13		
				(48)	(0)		388	14		
Dec. 10	12 24	7528	−34	0	+10	36	194	1	G	Mt. Wilson.
		7529	−9	25	+20	22	145	10		
				(34)	(0)		339	11		
Dec. 11	10 35	7528	−21	1	+10	23	194	1	P	Do.
		7529	+1	23	+20	20	48	1		
		7529	+7	29	+30	22	121	3		
				(22)	(0)		363	5		
Dec. 12	10 47	7528	−7	1	+9	13	194	1	G	U. S. Naval.
		7529	+14	22	+19	24	24	3		
		7529	+23	31	+20	31	97	4		
				(8)	(−1)		315	8		
Dec. 13	10 31	7530	−41	314	−6	41	24	3	VG	Mt. Wilson.
		7528	+6	1	+9	12	194	3		
		7529	+28	23	+18	33	24	8		
		7529	+37	32	+21	41	73	4		
				(355)	(−1)		315	18		
Dec. 14	11 14	7530	−27	315	−6	27	24	5	P	U. S. Naval.
		7528	+21	3	+10	24	194	1		
		7529	+50	32	+21	53	73	1		
				(342)	(−1)		291	7		
Dec. 15	13 42	7530	−13	314	−6	14	48	6	G	Do.
		7528	+35	2	+10	37	170	1		
		7529	+65	32	+21	68	48	1		
				(327)	(−1)		266	8		
Dec. 16	10 45	7530	+1	317	−6	6	24	4	G	Mt. Wilson.
		7528	+48	4	+10	49	170	3		
		7529	+79	35	+21	79	48	1		
				(316)	(−1)		242	8		
Dec. 17	11 7	7530	+15	317	−6	16	24	4	F	U. S. Naval.
		7528	+61	3	+10	62	97	1		
				(302)	(−1)		121	5		

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR DECEMBER 1942—Continued

Date	Eastern standard time	Mount Wilson group No.	Heliographic				Area of spot or group	Spot count	Plate quality	Observatory
			Difference in longitude	Longitude	Latitude	Distance from center of disk				
1942	h m		°	°	°	°				
Dec. 18	13 0	7528	+74	2	+10	75	97	1	F	U. S. Naval.
				(288)	(−1)		97	1		
Dec. 19	10 51	.....	No	spots	.....	.....	.....	.....	VG	Mt. Wilson.
Dec. 20	10 44	7532	+2	265	+32	34	36	8	VG	Do.
		7533	−2	261	−7	5	12	2		
		7531	+63	326	−5	63	12	3		
				(263)	(−2)	.....	60	13		
Dec. 21	10 36	7534	−75	175	−5	75	48	2	G	Do.
		7533	+12	262	−7	12	6	1		
				(250)	(−2)	.....	54	3		
Dec. 22	10 45	7534	−56	181	−4	56	16	8	G	Do.
		7533	+29	266	−8	30	48	6		
				(237)	(−2)	.....	64	14		
Dec. 23	12 2	7536	−78	145	+6	78	48	1	F	U. S. Naval.
		7534	−35	188	−3	35	6	1		
		7535	−32	191	+4	33	24	3		
		*	−28	195	−8	30	24	1		
		7533	+43	266	−7	43	97	4		
				(223)	(−2)	.....	199	10		
Dec. 24	14 55	7536	−63	145	+7	64	97	7	VG	Do.
		7533	+59	267	−6	59	97	4		
				(208)	(−2)	.....	194	11		
Dec. 25	11 42	7536	−50	147	+6	50	145	4	P	Do.
		7533	+69	266	−6	69	97	2		
				(197)	(−2)	.....	242	6		
Dec. 26	11 54	7536	−37	146	+6	38	194	5	F	Mt. Wilson.
		7534	−1	182	−3	1	12	1		
				(183)	(−2)	.....	206	6		
Dec. 27	11 29	7536	−23	147	+6	24	194	9	VG	Do.
				(170)	(−2)	.....	194	9		
Dec. 28	12 0	7536	−9	148	+5	13	242	8	G	Do.
				(157)	(−3)	.....	242	8		
Dec. 29	11 26	7536	+5	149	+5	10	242	6	F	Do.
				(144)	(−3)	.....	242	6		
Dec. 30	10 44	7536	+18	149	+5	21	194	5	G	Do.
				(131)	(−3)	.....	194	5		
Dec. 31	10 50	7537	+7	125	+15	19	12	2	G	U. S. Naval.
		7536	+32	150	+5	33	145	1		
				(118)	(−3)	.....	157	3		

Mean daily area for 31 days = 336

*Not numbered.
VG = very good; G = good; F = fair; P = poor.

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Chart I. Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, December 1942

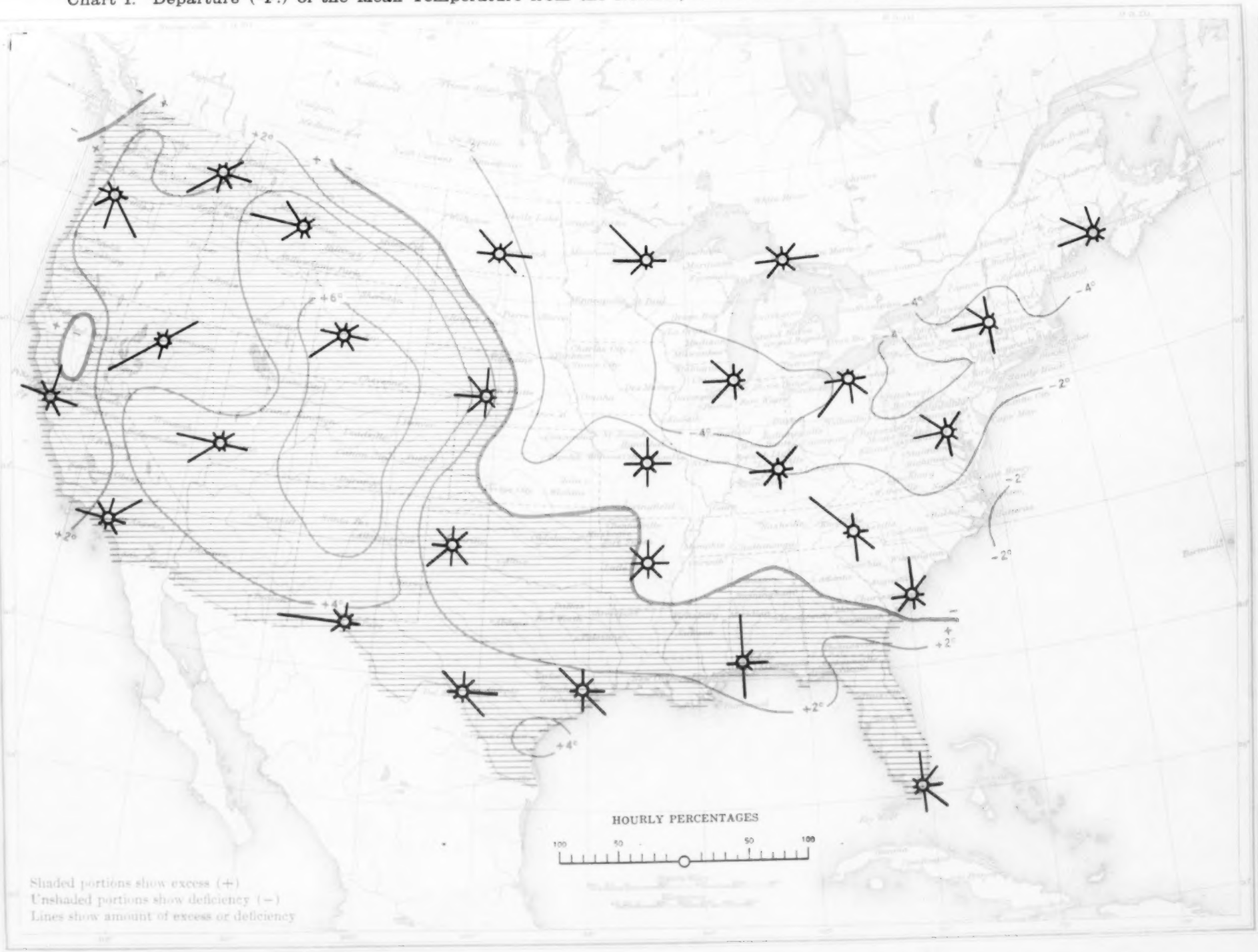
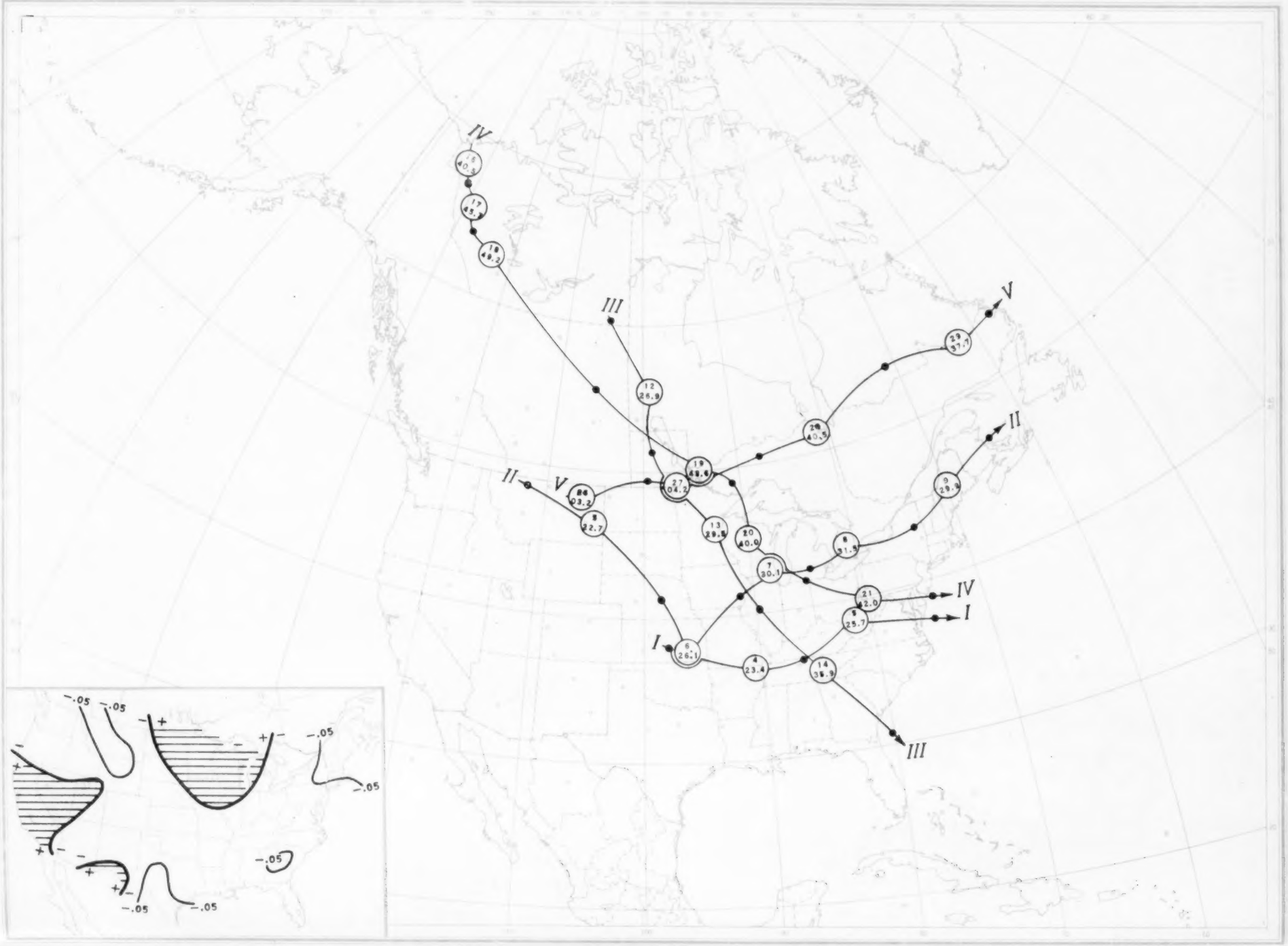
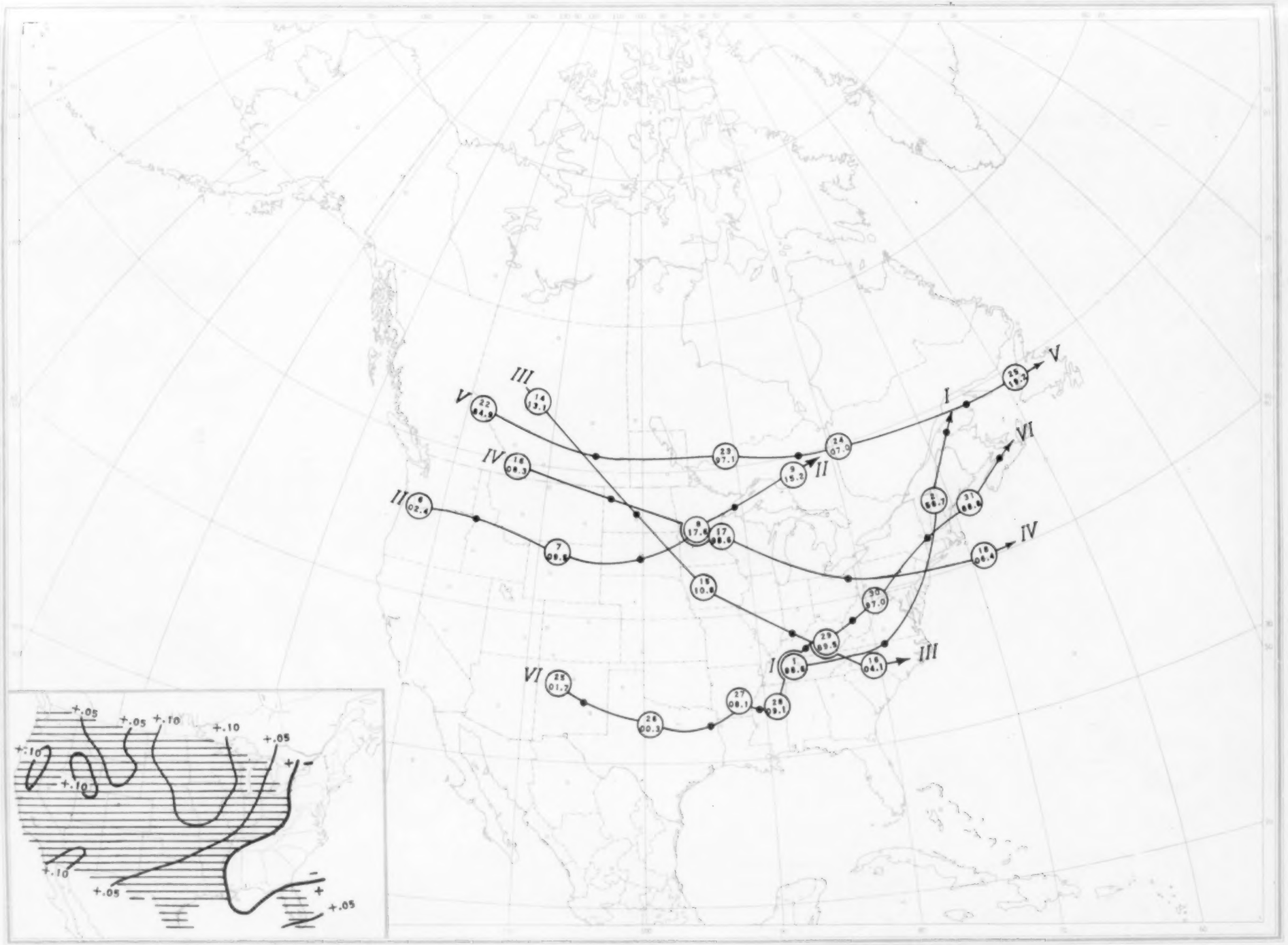


Chart II. Tracks of Centers of Anticyclones, December 1942. (Inset) Departure of Monthly Mean Pressure from Normal



Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (75th meridian time)

Chart III. Tracks of Centers of Cyclones, December 1942. (Inset) Change in Mean Pressure from Preceding Month



Circle indicates position of cyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of cyclone at 7:30 p. m. (75th meridian time).

Chart IV. Percentage of Clear Sky Between Sunrise and Sunset, December 1942

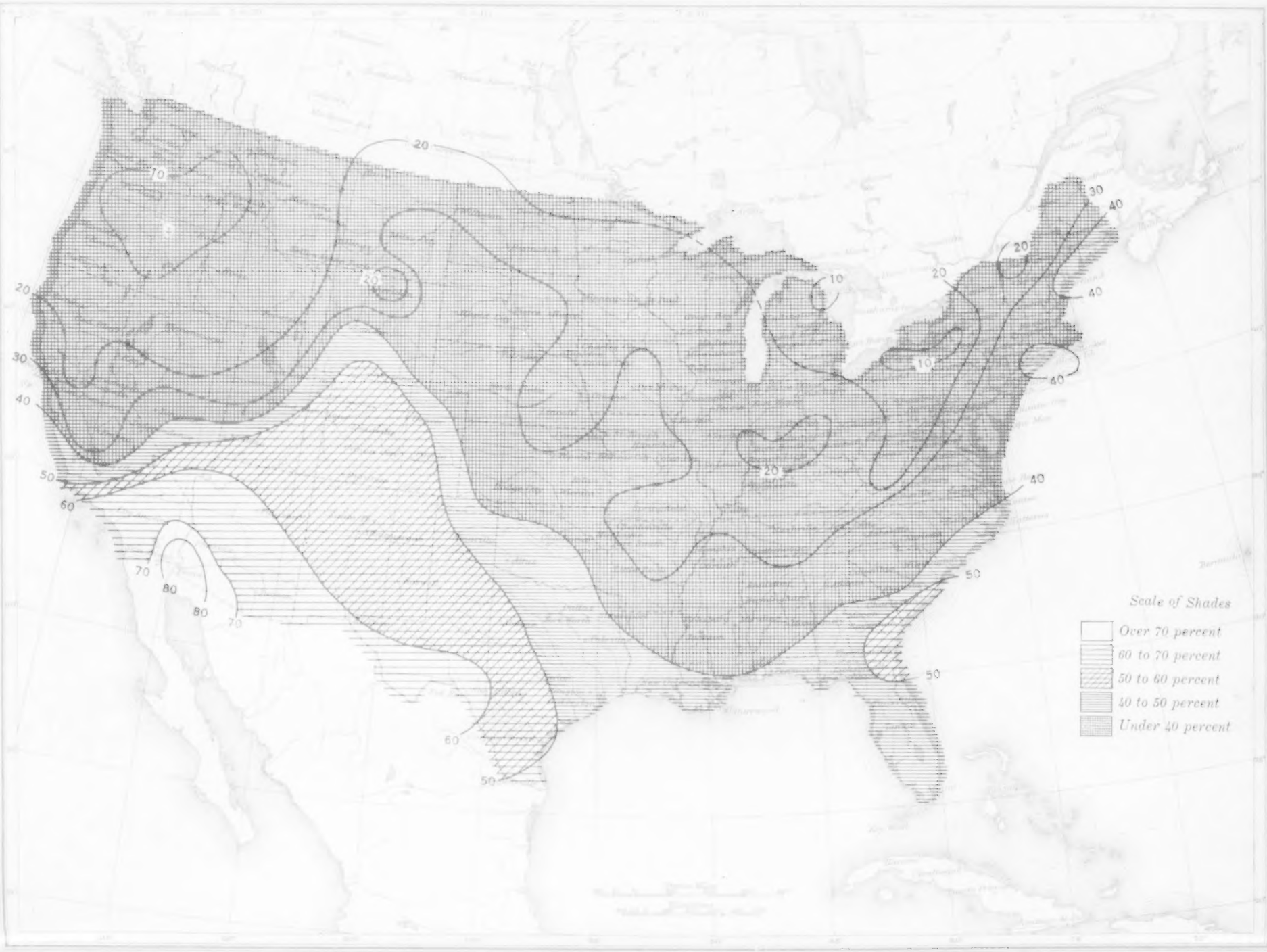


Chart V. Total Precipitation, Inches, December 1942. (Inset) Departure of Precipitation from Normal

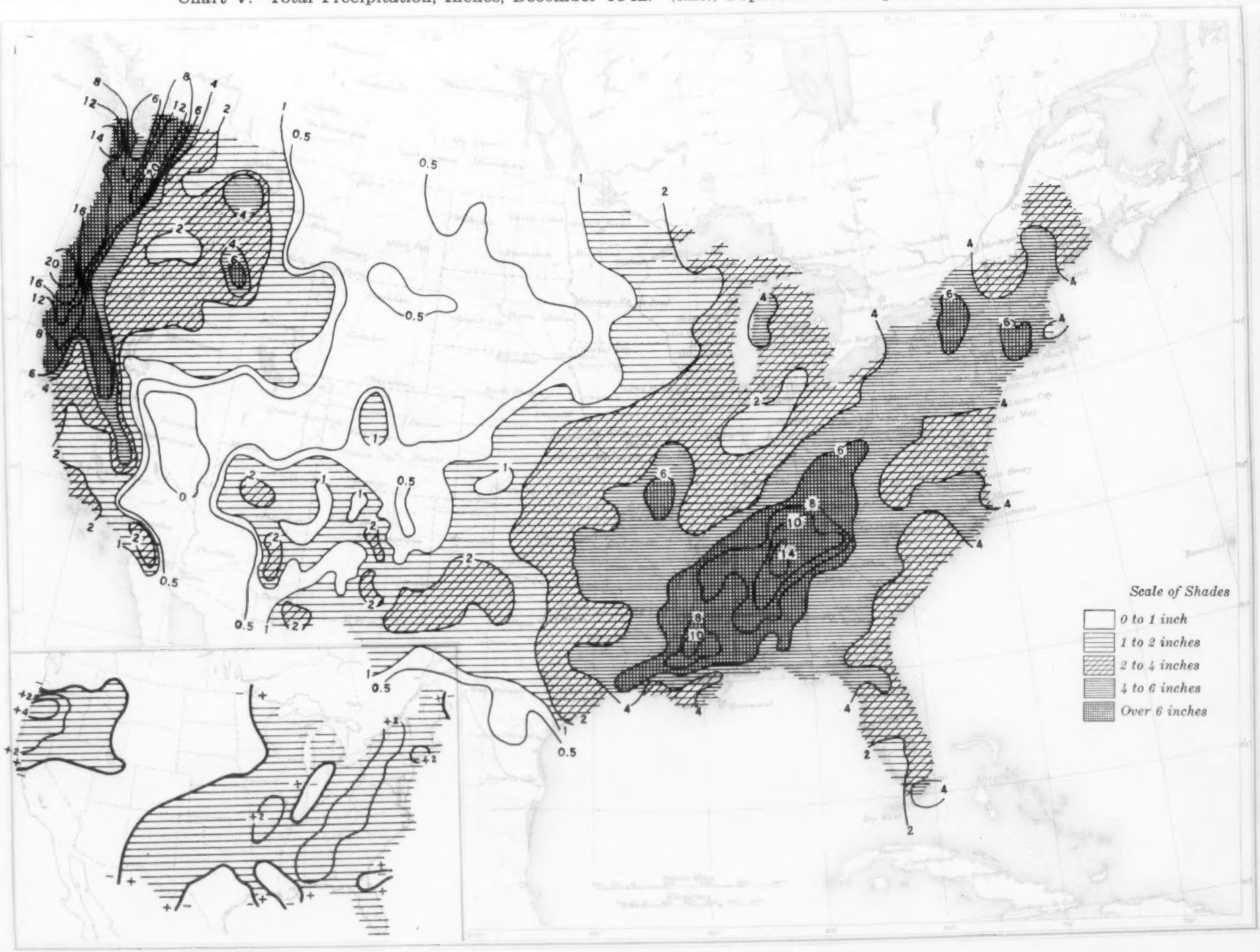


Chart VI. Isobars at Sea Level and Isotherms at Surface; Prevailing Winds, December 1942

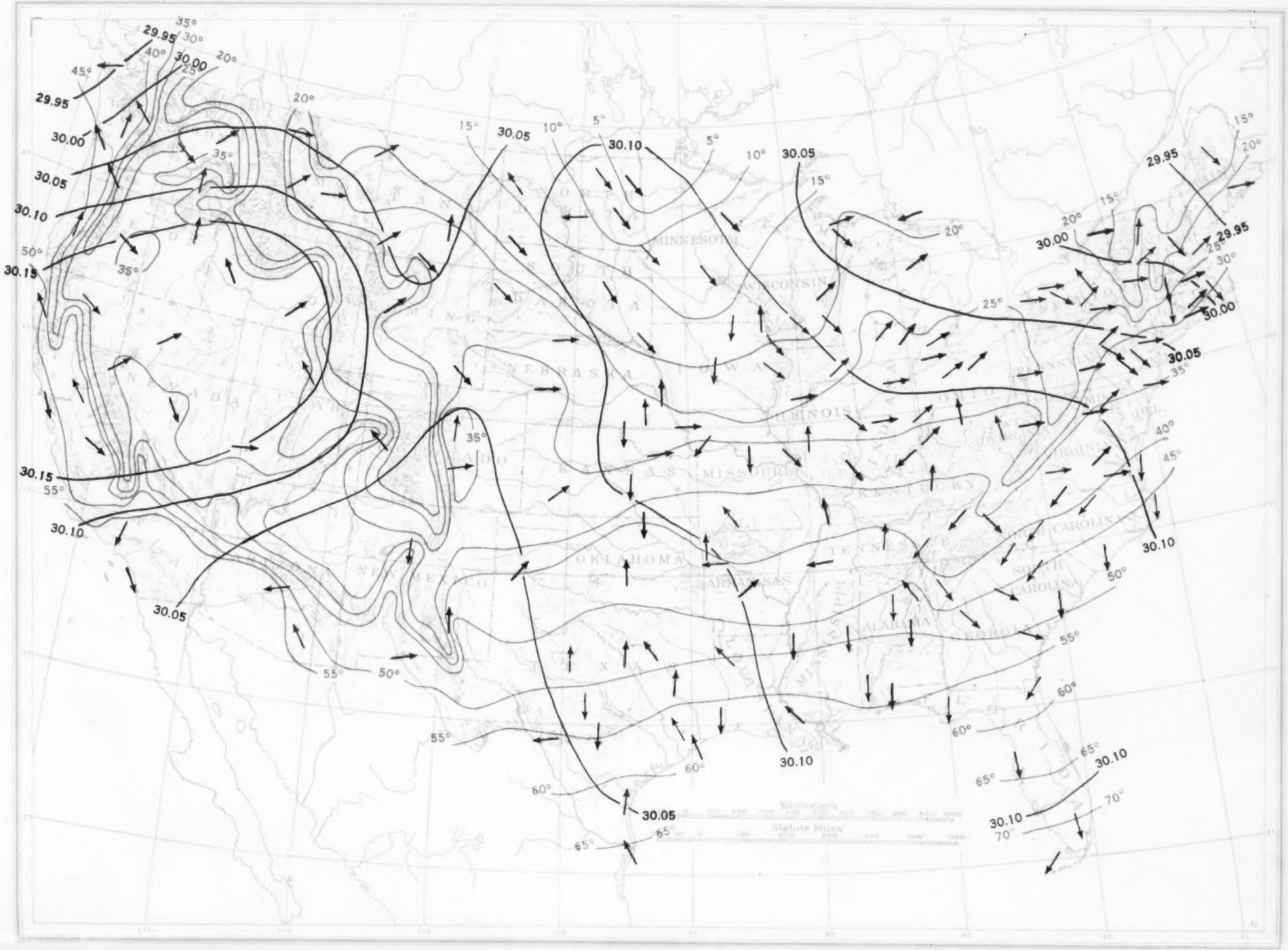
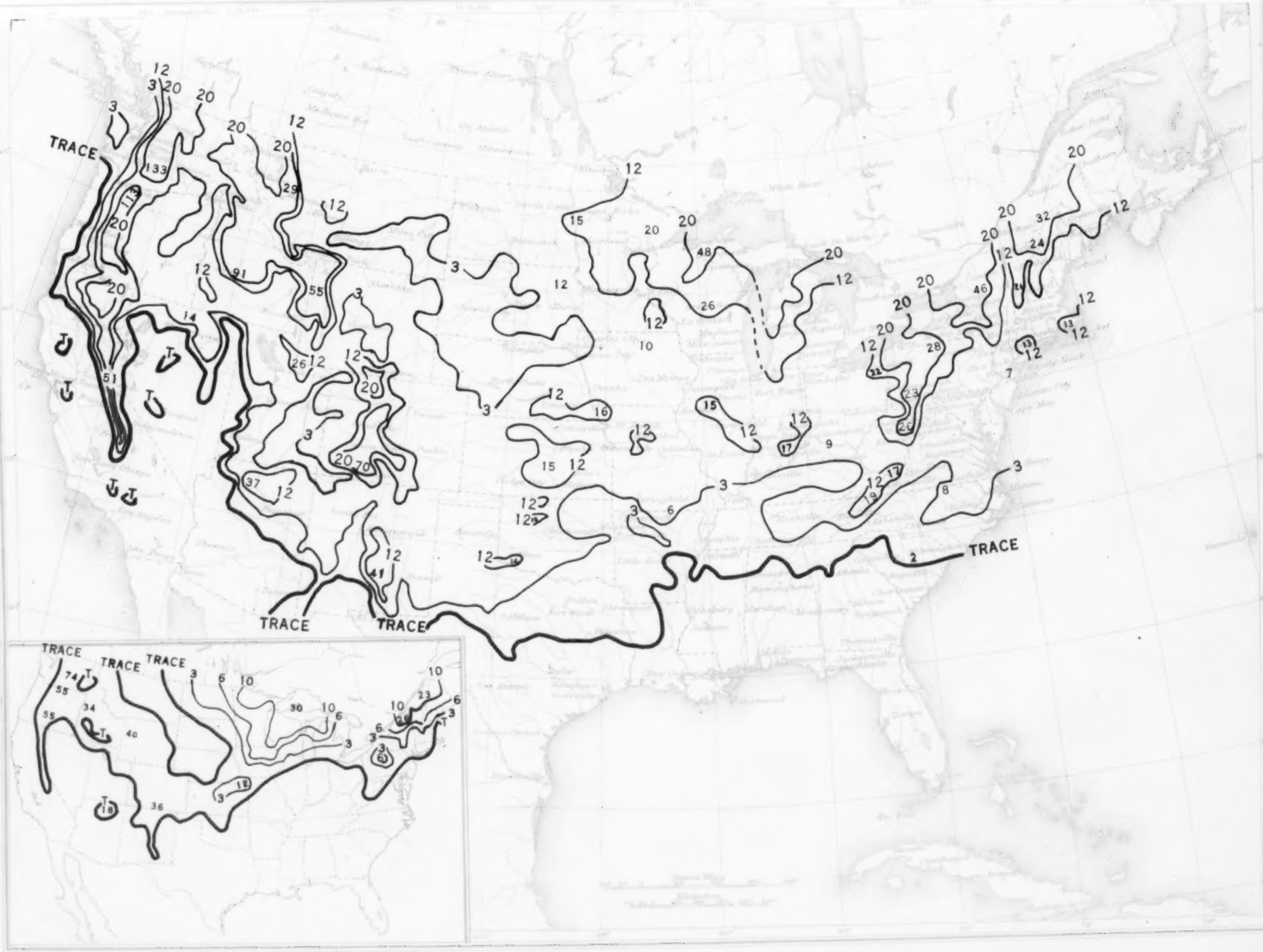


Chart VII. Total Snowfall, Inches, December 1942. (Inset) Depth of Snow on the Ground at 7:30 p.m., Monday, December 28, 1942



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